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THE ENGINEER IN NAVAL WARFARE.

BY COMMODORE GEORGE W. MELVILLE, ENGINEER-IN-CHIEF OF THE UNITED STATES NAVY; W. S. ALDRICH, PROFESSOR OF MECHANICAL ENGINEERING IN THE UNIVERSITY OF WEST VIRGINIA; IRA N. HOLLIS, PROFESSOR OF ENGINEERING IN HARVARD UNIVERSITY; GARDINER C. SIMS, OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS; AND GEORGE UHLER, PRESIDENT OF THE MARINE ENGINEERS' BENEFICIAL ASSOCIATION.

I.

"*The naval supremacy of Great Britain rests in the hands of the engineers.* War rumors force such truths home, and they will be driven yet more forcibly home to the Admiralty before the year is out. Mr. Goschen (the First Lord of the Admiralty) *must* take steps to add to the number of engineers. Men cannot be had now, because the position and pay are not good enough. Is it too much to hope that the First Lord of the Admiralty will use his own eyes, and his own ears, and his own great common sense, and instead of allowing himself to be led by others, take the initiative, and, recognizing the importance of the naval engineer, place the profession on such a footing that entrance to its ranks may come to be sought for with eager anxiety?"

That great scientific periodical, *The Engineer*, of London, in its leader of February 7, 1896, thus startled the rulers of Britannia, and before the appeal had been read in the colonies of

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Queen Victoria, the authorities had promised that reforms would be made in the relation of the engineering to the other branches of Her Majesty's Navy.

The same journal also declared that "while peace prevails it is possible for the Admiralty to pursue a policy of foolish economy" in trying to get along without a sufficiency of naval engineers; "but when war threatens—when, in fact, it is within measurable distance—any policy which endangers the national safety becomes criminal."

La Marine Francaise, in its issue of February 10, 1896, and speaking from a standpoint of loyalty to the sailor, affirms:

"Whether we like it or not, there is strife between the deck and the engineer officer. While the *rôle* of the former is growing less every day, that of the latter is constantly increasing in importance. Everything is engines in the Navy. We refuse to admit it, but strife does exist, and it is only when compelled and forced that we give the engineer due rank and authority. Formerly everybody *had* to be a sailor, now everybody *should* be an engineer."

The *Engineering News* of New York, of February 20, 1896, in a conservative editorial, declares that the demand for reorganizing the Engineer Corps of the United States "is probably not exceeded in importance with respect to our national defences by that of any measure which will come before Congress at this session." It further declares that:

"The existing demands of modern naval construction, maintenance, and tactics, are such that naval engineers, in order to proficiently perform all of the many duties demanded of them, ought to be the most highly-educated and scientifically-trained officers of the service. To say that any man loses caste socially by entering this branch of the naval service is silly and unworthy of a sailor. The work of the engineer officers in the creation of our new navy has called forth the heartiest praise from the experts of all nations; and anything that tends to deteriorate the quality of future graduates from the Naval Academy in the engineering branch cannot be swept away too soon."

Is it not significant that these representative technical papers of the three wealthiest and greatest manufacturing nations should publish such forcible and similar views within a few days of each other, although looking at the matter from different commercial, political, geographical, military, and national standpoints? It can only be accounted for by the fact that the military officials of these countries were suddenly aroused to the necessity of preparing a defence for a time of emergency. A careful study

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of their respective naval organizations convinced experts that a spirit of caste and service traditions of mediæval origin had prevented the engineer from placing the modern battle-ship in a state of efficiency. The technical journals thus simply reflected the views of those who had this military and engineering problem to solve.

This is the age of the engineer, and he will be the great factor in modern warfare, whether the contest be waged by land or by sea. The rapidity with which the division of an army can be moved by mechanical means may decide the destiny of a nation. The skill of the mechanical engineer in mounting and protecting a gun, and in devising arrangements whereby it can be served and worked more readily, determines the value of the weapon whether it is placed in a fortress on shore, or in a turret on board a ship. The ability of the superintendents of our great industrial plants to provide munitions of war will be of more importance than the enrollment of brigades without rifles and cartridges.

The work of engineers like Bessemer and Siemens forced the construction of steel fleets. But the passing of ships of oak to make way for these vessels of steel should have been accompanied by corresponding changes in the organization of the crews. The requirements of a modern battle-ship are not founded upon the necessities of wooden frigates, and unless a radical change is made in the internal policy of our warships we invite a calamity in the day of battle.

The efficiency of the modern battle-ship, which is a series of separate compartments, must depend upon others besides the commander. It will be influenced by the endurance of the fireman behind the ram, that unseen stoker whose station is in front of the roaring furnaces. It may be determined by the skill of the machinist, who maintains in order the hydraulic gear connected with the gun mounting; for it will take but few weeks to train a man to sight a weapon and pull the lockstring, while it may require years to master the difficulties which are encountered on board ship in making hydraulic joints. The training of the men around the decks will be a simple matter compared with the organization of an efficient force in the engine and fire-rooms.

The trained engineer is a combatant in naval warfare,

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for he is not only exposed to all the dangers from the ram and the torpedo, but also to the perils that confront him in managing the great boilers and engines. Is that man "a non combatant" who has the supervision of three sets of propelling engines, the management of a half dozen batteries of boilers and the maintenance of scores of auxiliary machines installed in places almost inaccessible for repairs but absolutely essential to the efficiency of the vessel?

Within the limits of a short article it is impossible to show the developments that have taken place. It is a certainty that the changes have resulted in the possession, by a warship, of three weapons—the gun, the ram, and speed. In the days of sail the vessel had one weapon only—the gun. It may surprise a layman to be told that speed is a weapon, but an element which permits the commander to seek or avoid a conflict, which allows him at will to move without the range of the enemy's guns, which will enable him to drive from the sea the commerce of his opponent, is a positive arm, and it is so regarded by all who have studied war as a science. *Speed, and particularly its control, is the cardinal element of tactics.* As the Earl of Hopetoun said a few weeks ago, in his presidential address before the Institution of Naval Architects, in London, "the weather-gauge of to-day is the power to out-steam the fleet of the enemy."

Ability to manœuvre is now more dependent upon the shape of the hull, and the number, form, and position of the propellers, than it is upon the skill of the most expert commander. With the advent of steam the possibilities of the warship vastly increased. As each successive auxiliary was installed the potency of the vessel was augmented, particularly when these machines were placed in the charge of trained men who were able to maintain them in a state of efficiency.

Steering engines and twin screws have improved the manœuvring qualities of vessels, and thus increased the offensive power of warships. No comparison can be made between the tactical possibilities of steam vessels and the sailing craft of a former decade. The engineer's work has determined absolutely the tactical diameter of the vessel, and when this is once established, the commander can secure it at will, for it is simply a question of using sufficient engine power to secure a given speed. In ancient days, skill in seamanship regulated the tactical diameter of the brig,

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and as a result victories were won by the way in which the sails were handled.

The change in our warships will necessitate the development of one talent which was not so essential to the commander of the sailing craft. That quality is "nerve" and absolute reliance upon others. Inclosed in the conning tower, the commander will be dependent to a remarkable degree upon his chief engineer. Fortunately for the good of the service, the engineer in the day of battle will not be told how to manage the motive machinery by a trinity of men claiming to be vested with supreme authority. The captain of the vessel will be compelled to depend upon the ability of the engineers. The master of an old ship-of-the-line had a better knowledge of his crew than the commander of a modern battleship possesses of the feelings and resources of the men below the protective deck and of the efficiency of the machines under their charge. The capable commander will be as much concerned about disablements within the vessel as he will fear shots from without. In times past an inspiring act might revive the courage of depressed crews, but something more than courage will be required to secure efficiency from impaired machines.

The training of a Naval Engineering Reserve of officers is an important military question, and the scientific institutions of the country have a duty to perform in this matter. I have noted the work of engineer officers taken into our naval service by the many methods attempted. It has been my pleasure to have been associated with nearly every strong man who has been a member of the Corps of Naval Engineers. Friends like Isherwood, Haswell, and Copeland were among the officers who designed the excellent machinery of the ships of the Civil War. My contemporaries are the chief engineers of battle-ships like the "Indiana," and they have most efficiently supervised the construction of these vessels. Nearly all my assistants have been engineer graduates of the Naval Academy, under the system which obtained prior to 1882, when cadets were specially entered for the Engineer Corps. Advantages have thus been given me to study the question of how our naval engineering *personnel* should be educated. It is imperative that they receive military training, but the safety of our fleets demands that all should obtain more engineering instruction than is now given at the Naval Academy, where the cadets

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assigned to the Engineer Corps are given but one year in marine engineering. The co-operation of the many scientific colleges and schools should be secured without delay.

The institution at Annapolis must be brought into competition with the scientific colleges. This policy would be of advantage to the cadets, to the competing institutions, and to the navy. Annapolis is either unable or unwilling to train naval engineers, and if its work is brought into comparison with that of other institutions, the Naval Academy will be compelled to extend its engineering curriculum or show cause for its existence.

The naval engineer has attempted to use industrial methods in the design, construction, and management of the machinery of our warships. He has urged that the military routine, which may be necessary for a marine guard, cannot be applied to the management of the fire-room force. He has been thwarted in his laudable efforts to reform the service by the words "strategy" and "tactics." Improvements proposed by him are said to interfere with the tactical rules that have been handed down from previous centuries. A policy suggested by the engineer is declared not in harmony with the strategy of naval warfare. His future usefulness thus compelled the engineer to give some consideration to the study of war. It was not long before he learned that strategy was a science, and tactics a very simple art which often related to routine duties that could be acquired by the drill sergeant. The Commander-in-Chief of the English army declares that any competent captain of a company can teach tactics to his subordinates.

Strategy is a science. It has been defined as: "The work and genius in the accomplishment of a military design." The engineer soon discovered that his work was of importance in the accomplishment of naval designs. In designing propellers, in shaping the hull, in controlling the power which will determine the efficiency of the gun mount, in providing reliable steering engines, in planning ventilating systems which will always be serviceable, in arranging a forced draft system which will be useful in emergencies, and in accurately placing about fifty miles of piping and seven hundred valves which are required on board a modern battle-ship, the engineer realizes that the strategic possibilities of a modern fleet of battle-ships are greatly dependent upon his thought and handiwork. He knows that strategy is important, but he

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knows all strategy will fail which does not recognize the fact that success will be dependent upon the efficiency of the machines as well as upon the courage of the few men around the guns.

The engineer's work is carried on in a vitiated atmosphere, in cramped quarters, and he will be subjected to a strain whose intensity can only be realized by those who have taken part in a full powered trial of a modern cruiser. The successful torpedo boat builder of England, Mr. Thornycroft, says :

"In making the tour of his department, the chief engineer will find that the beat of the propelling engines will be confused by the addition of a number of auxiliary appliances, each adding its own peculiar series of sounds to the din and confusion of the roaring steam and the rush of water. This discord will be further complicated by the fact that the auxiliary machines in their rate of working keep no constant ratio to each other or to the main engines. The sense of feeling will have to be exercised, for the changes of temperature which may disable the auxiliaries can only be detected at times by touch. The eye is even put to a great disadvantage, for the motion of the reciprocating parts will be so rapid that no particular position of any working portion can be assigned to it. With a spray of water and oil thrown in their eyes, all those below will have their vision temporarily impaired."

While undergoing this ordeal, the engineer must have a clear mind for directing repairs, avoiding accidents, overcoming casualties and arranging stations. He must be cool in emergency, ready in resource, and possess physical and moral courage of high degree.

The artificers, engine drivers, warrant machinists, call them what you please, will have a light burden in battle compared with the trained engineer. This officer will have to supervise all the machinery below the water line. When the ship is cleared for action he must inspire that isolated band of firemen and mechanics hermetically sealed below the protective deck. Looking, therefore, to the engineer for instruction, for direction, for advice in emergency, and for support in danger, will be that body of unappreciated men who constitute his force.

The physical history of the Engineer Corps for the past five years has been impressively told by the Surgeon General of the United States Navy, and shows conclusively that men cannot endure this work for a protracted period. Those in charge of the machinery of an ocean greyhound or modern battle-ship will have but a short official life, and it behooves this nation to prepare a powerful engineering reserve for future needs.

In building battle-ships without providing for a trained and

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sufficient corps of naval engineers, there is a royal road to disaster and defeat. There is a path to victory by recognizing the fact that the advent of the engineer, with his industrial methods, is a direct gain to the efficiency and glory of the naval service.

If the engineer is not worthy of official recognition, and of some of the emoluments of the naval service, as he stands in that magazine of death, with clear brain and steadfast courage, holding in his firm grasp the heartstrings of the ship, then a new lexicon is required to define his worth. If he falls beneath a maze of wrecked machinery, or within a blast of scalding steam, or sinks to ocean depths in the closed compartment, either he dies as heroes die, and his career has been honorable, or the world's ideal needs revision.

GEO. W. MELVILLE.

II.

SUCCESS in naval warfare is often developed out of conditions over which it has no control. Usually such conditions mark the epoch and form the distinguishing characteristics of the period. From the trireme to the "Minneapolis" was a great stride. There was only one intermediate step, however, and that through the epoch of sail power, if we accept the following dictum of one of the ablest tacticians of the new navy:

"The object of all manœuvres in action is to get and keep the enemy within effective range; to blank some of his fire by getting a superior position; to hold an advantage gained, or, losing it, to manœuvre for a fresh one; to concentrate fire on an exposed flank of the enemy in order to reduce the tactical efficiency of all his ships by crippling one or more."

These great principles are eternal. They were as applicable over two thousand years ago with oars as motive power, as in the days of the "Constitution" and "Guerriere," or in the more recent naval battle of the Yalu. What then has changed? Simply the motive power and the method of handling it, as called into requisition in carrying out the formulated principles of naval tactics. We are not now discussing the evolution of the weapons of offence and defence, nor the possible minute changes in naval tactics wrought by the developments of ordnance. Whether attacking with arrows or with shot and shell, the one thing needful is "to avoid waste of ammunition; but, of all things to keep up an effective and destructive fire."

Singularly enough history is repeating itself in naval tactics.

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Steam power permits of massed formations, if the units can manœuvre adroitly together, even as in the days of the trireme. In fact, this is the distinguishing characteristic by which modern tactics differ from those of sailing days. But what a transformation meanwhile! And with it the passing of the sailor and the advent of the engineer! We shall not stop to discuss whether he has come to stay. As long as he can obtain coal, oil, or some other source of motive power than the capricious winds, there shall not be stretched another stitch of canvas on any naval vessel.

Steel warships are now propelled by engines of over twenty thousand horse-power and costing over one million dollars. In almost innumerable compartments are placed the auxiliary machinery and accessories. The ship is lighted by electricity, heated by steam, cooled by compressed air, and steered by hydraulic power. These four great agencies are also used for all sorts and conditions of service, capable at any moment of being called into operation by "pressing the button" on deck, while the engineer below deck does the rest. Passing from compartment to compartment one is almost lost in the bewildering maze of complicated machinery, demanded not alone for the propulsion of the ship, but for operation of the hoists, guns, steering gear, heating, lighting, and ventilating systems, and for the internal organization and management of what has not inaptly been termed "the engineers' ship."

This transformation has brought about conditions which must be fulfilled if all of this machinery is to be obtained of the best type and maintained in the highest state of efficiency. Engineering research is the new instrument of service in the hands of the engineer. Without some attention to it, present developments had been impossible. Without systematic work along these lines in the future, failure in naval warfare is a foregone conclusion.

In selecting the mechanical, electrical, hydraulic and compressed-air machinery used on board naval vessels, the questions of first cost and of yearly maintenance are vitally dependent upon being able to pre-determine its economical performance. Such machinery can only be operated most economically while cruising by making use of the latest experimental results along these lines The warship in commission is no place in which

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to try such experiments. Repeated failures have occurred to many appliances which have been placed on these vessels simply upon the recommendation of the manufacturers or of others interested.

Preliminary experimental work would cost a trifle compared to the present yearly outlays of the government for the maintenance of the uneconomical machinery, auxiliaries and accessories on board several of our modern men-of-war. Very few of these have had their performance pre-determined. Such information cannot be obtained by the navy from private corporations and manufacturing establishments. The gravity of the situation respecting the value of naval engineering research is fully recognized in England. *Engineering*, of London, remarks:

"A private contractor works for private gain. The results of his experiments are as much his capital and property as the tools in his shop or the balance he may have at the bank. In the case of the navy it is the public that pays; and it is the public that has a right to know its money is not wasted."

The private establishments of our country may lead the world and be able to furnish the navy all the material it needs; but it is a fact only too well-known that of all purchasers the government can obtain the least information concerning the materials, mechanism and machinery it is about to install on its war vessels. Such engineering data and information must be obtained by the government, through the navy, at its own expense and for its own use.

Engineering research is now demanded by the exigencies of business, the keen competition of trade and the development of industry. The large manufacturing establishments, railroads and steamship companies have their testing departments or experimental staff to inspect their purchased supplies quite as much as to test their own manufactured products. Several British steamers of late construction have incorporated many minor improvements suggested by researches made by the engineers of their company. Along this line, *Engineering*, of London, takes occasion to remark:

"Our great shipping firms have long recognized that they can only maintain their national supremacy as the carriers of the world by reducing their 'running expenses' to the lowest possible minimum. . . . Some firms have allowed and encouraged their engineers to prosecute scientific research. . . . The various questions are treated not only scientifically,

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but as they affect the owner's pocket, for this, after all, is the ultimate factor in problems in marine engineering. . . . The whole question of marine engineering testing and research has assumed a national importance of the most pressing nature. . . . The results of Admiralty trials leave much to be desired: many practical points are either omitted, or are given in an incomplete form."

Speed trials, builders' trials, contract trials, coal endurance trials, and "Admiralty" trials are all adapted to furnish just such information as they are designed to supply, and no more. The trend of modern engineering development is along inductive rather than deductive lines. The great achievements of engineering now witnessed on every hand are very largely due to the progressive and systematic development of research.

Foreign governments have long recognized the value of experimental work as directly affecting the efficiency of their naval establishments. England has a thoroughly equipped and organized chemical testing laboratory at Greenwich. At the Kiel navy yard, of the German Government, double-ended marine boilers are tested under all the conditions under which they are ever likely to be used on board ship; and while being thoroughly tested before going into the ship, every opportunity is afforded to note defects and remedy them. In France, Italy and Russia most elaborate experiments have been carried on by individuals, boards and specially-appointed committees, for the promotion of Naval Engineering progress. In a former article we pointed out the great value of the French Government experiments, in 1884-5, on the specially-fitted triple-screw steam launch "Carpe," as warranting the introduction of this system of propulsion for the new cruisers "Columbia" and "Minneapolis."

The problems of the naval engineer are essentially dynamic. They admit of the most intelligent solution only by the use of experimental data and the pre-determination of similar problems, investigated on a small scale, as in the case of the triple-screw experiments of the "Carpe." With the larger questions of marine engineering involved, such problems are quite beyond the range of private research.

Much valuable work has been done by individuals, such as Froude, Yarrow, Russell, and Marchal, for foreign navies, as well as by the research committees of technical societies, such as that on Marine Engine and Boiler Trials of the British Institution of Mechanical Engineers. In our own country, Isherwood,

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Loring, Emery, Thurston, and others among our naval and ex-naval engineers, as well as Government Experiment Boards, have rendered like valuable services.

The problems of to-day are without precedent. Research must be made a business and not a passing pleasure. Organized efforts are now an absolute necessity to cope with the difficulties, bear the expense and successfully prosecute the experimental work now demanded by engineering in general and by naval engineering in particular. There is a growing recognition of the fact that the most efficient work can be done and the most satisfactory results obtained with a permanently located equipment in naval engineering experiment stations, with thoroughly organized staff working with clearly defined objects in view.

The efficiency of the machinery of the cruiser, ram or battleship involves such problems as can be best satisfactorily settled in an experiment station. In no other field of professional work can research and investigation yield such fruitful results and so greatly increase the efficiency of the United States Navy as in this one of engineering. The intelligent design of the mechanism, motive-power machinery and accessories of naval vessels is being more and more based upon the results of tests, trials, researches and scientific investigations.

At the Naval Engineering Experiment Station which it is now proposed to establish and maintain at New London, Connecticut, various engineering problems would be investigated on a small scale, similar to those long carried on by foreign governments, to obtain data for the intelligent solution of the larger problems of naval engineering design. New appliances would be thoroughly tested that they might be rejected if found wanting in efficiency and economy. New methods would be subjected to searching investigation. There would be thus secured for the naval service the very best materials and the highest types of motive-power and other machinery and accessories for warships and other naval vessels. Only in this way can our navy maintain any supremacy which it may now seem to have in the intelligence and skill of its engineering department.

Experimental engineering is capable of rendering the most valuable assistance in building up the new navy and maintaining the same in the most efficient condition. Future progress will be slow and will be attended with great risks and frequent fail-

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ures if the United States navy does not recognize the efforts, now being made in all branches of marine engineering, to improve older types and present forms of the several varieties of mechanism, auxiliary and motive power machinery.

Federal aid for the promotion of engineering research in the several States has not yet received the recognition accorded to agricultural science by the Hatch act, of 1887.

During the past few years there has been growing a belief that every State College and University which is a beneficiary of the Land Grant bill, of 1862, and the Morrill act, of 1890, should receive a new national endowment. This should be devoted exclusively to the establishment, equipment and yearly maintenance of State Engineering Experiment Stations. The relation of these to engineering education and scientific investigation, to the diffusion of practical information among the people and the industrial development of each State, would be analogous to that now borne by the several State Agricultural Experiment Stations to agricultural science. Moreover, advisory and co-operative relations with government are vital to the mutual advantage of the government and the cause of each State's industrial development. In much the same way that the agricultural stations have established such relations by and through the Department of Agriculture, it is proposed that the engineering stations shall establish similar relations by and through the Department of the Navy.

The several State Engineering Experiment Stations will form invaluable aids to the government and materially assist its prosecution of scientific investigation and engineering research for the best interests of its naval service. These stations will afford facilities for post-graduate work and research to properly accredited graduates of technological schools, as well as the detail of naval engineers which the government may direct for such purpose. Being located in the several States they will be able to enlist the co-operation of builders, manufacturers and industrial establishments in the prosecution of such experimental engineering work as will secure to the government the best materials and the highest types of motive power and other machinery and accessories for warships and other naval vessels. The Secretary of the Navy may indicate from time to time such lines of inquiry and research as shall seem most important to the government,

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and which may be most advantageously carried on in some one particular State.

Many engineering students in the Land Grant or federally-endowed institutions, receive military training and instruction. This makes possible an organization and development of combined engineering education and military training along such lines as have been worked out at the naval and military academies. The State colleges and universities, therefore, which are in some official way connected with the federal government and receive the national grants of money on condition of providing for such military instruction may become valuable agencies in supplying trained engineers should they come to be recognized as proper fitting schools for the government's naval service by Civil Service examination and appointment. The present co-operation of government with the States in engineering education and the proposed co-operation in engineering experiment, similar to that now existing for agricultural education and research, will strengthen and elevate the standard of engineering education, form powerful factors in the development of the industries and natural resources of the several States, and be of mutual advantage to the naval service and to the general government.

WM. S. ALDRICH.

III.

IT is strange in a country so democratic as the United States to find the engineer making a plea for recognition. His work and influence have been more potent than the efforts of the statesman in forming our Republic. The inventors of the steam engine and the steel rail have done more to weld together the parts of the continent than the signers of the Declaration of Independence, and the influence of James Watt is likely to survive all changes of governmental forms. In 1819, when England was struggling with vast economic problems, and when the steam engine and mechanical appliances were still in their infancy, Lord Jeffrey wrote of Watt and his inventions:

"It would be difficult to estimate the value of the benefits which these inventions have conferred upon this country. There is no branch of industry that has not been indebted to them; and, in all the most material, they have not only widened most magnificently the field of its exertions, but multiplied a thousand fold the amount of its productions. It is our improved steam engine that has fought the battles of Europe, and exalted and sus-

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tained, through the late tremendous contest, the political greatness of our land. It is the same great power which now enables us to pay the interest of our debt and to maintain the arduous struggle in which we are still engaged."

If this was true in the days of Nelson and Wellington, how much truer it is in our day and in our country. The history of the world contains few influences which have entered so fully into the lives of a people as the mechanical appliances which have had their origin in the steam engine, and nowhere else have these appliances worked greater changes than in the means of transportation. Instead of the lumbering stage coach, we have the limited express; instead of the sailing clipper, the ocean "greyhound." Our warships have felt this quickening. The death-blow of the old system of sails and wooden hulls was struck when the ram of the "Merrimac" entered the hull of the "Cumberland." Since then our ships have changed to steel, and the sails have made way for steam. No government would dream now of putting sails on an ironclad. Few modern cruisers are fitted with them. The warships have become great workshops. The "New York" contains seventy-three engines and pumps, and the "Columbia" ninety-four.

We know well that within the last generation the engineer has advanced greatly in social and business consideration in civil life, that schools have been founded all over the country for his education and training, and that he bids fair within the next generation to take his rightful place as an acknowledged leader in all that concerns the material welfare of the human race.

It is well, then, to inquire how he has fared in the service of the government and what rewards he has there found under these changing conditions. In 1865, after the experience of a long war, the numbers of line or executive officers and engineers on the list of regulars in the navy were about equal, being 493 and 474, respectively, including all grades; in 1864, there were 2,846 line officers and 1,728 engineers, including volunteers; in 1896, after a complete transformation into a steam navy, there are 775 officers of the line and 198 officers of the engineer corps. The duties of the engineer have grown more important and multifarious, as the number of engineers has decreased and the number of his commanding officers has become greater. During this period, there has been a growing struggle between

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the engineers and the group of line officers surrounding the Secretary of the Navy, so that now all legislation looking towards that change of system made necessary by the advent of machinery is effectually checked. The engineers have become discontented and unhappy in their official relations and our ships have lost largely in their effectiveness. Congress has received dozens of memorials urging that the educated engineer is an unnecessary factor on our ships and that it is the practical mechanic who is needed. This mechanic is expected to enlist, to sleep in a hammock and to be content with a maximum pay of seventy dollars per month. The engineer's force, from one-fourth to one-half of the whole crew, is to be in charge of one commissioned engineer officer. These memorials invariably insist upon having highly educated men at the helm and at the guns. Congressmen may not be well informed on naval affairs, but they are not devoid of common sense and this distinction between the two classes of officers is difficult to make clear. As a matter of fact, any of the duties on board of a man-of-war can be learned in course of time by any American citizen of average intelligence and fair education, even though he is not graduated from the Naval School or a College. The main object of education, therefore, is to enable a young officer to learn his profession more quickly, to endow him with a higher sense of duty, and, perhaps, to introduce into our ships the liberalizing and refining influence of culture so necessary to men who for long periods live together cooped up in a small cabin; but this applies alike to engineers and deck officers.

We have heard much about our splendid *personnel*, and yet the stress of war would force us quickly into a complete change of system, both in administrative matters connected with the office of the Navy Department and the methods on board ships. There is scarcely a ship in commission to-day which is run with a due sense of economy to the government.

We read in the reports of the Secretary of the Navy that the line, or executive branch, is suffering from lack of promotion and that prompt measures must be taken in Congress to restore the efficiency of the corps by increasing the numbers in the "command grades"; not a word about the change which has actually taken place, that sails have disappeared, and with them a large element of the responsibility of the sailor. We have never had a

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Secretary who has had an insight into mechanical and technical matters. They have been lawyers, no doubt actuated by patriotic and fair-minded motives, hampered by too great a sense of the legal status of every question, and too often forgetting that a new ship may become a source of disaster, instead of a prop, to the country if her crew is not organized to meet all requirements of modern science.

There is no doubt that naval officers, both line and engineer, are actuated by a sincere desire to promote the interests of the country and to make our new ships successful in peace and war. We find, however, that the traditions and discipline of a military system too often blind the sense and enthrall the conscience of even the wisest and best of men. It may have been for this reason that our ancestors dreaded the effect of a permanent military force upon this Republic. We are suffering to-day from the effects of tradition continued from the days of sails; and the commanding officers educated when steam was auxiliary rarely comprehend the duties of the engineer, or the responsibilities of his position. As an instance of this we have in the navy regulations a fiction that any line officer in charge of the deck represents the captain, and must, therefore, have the right to interfere with everything on board ship. This is a survival from the days when the propelling power was sails and everything was in sight of the watch officer, to the time when the ship is a huge mass of machines and nearly everything is out of his sight. It has been a cause of much soreness, as it has served to multiply the number of commanding officers on board our ships beyond the patience and endurance of the engineer. In the controversy which has resulted, there has never been a hint from the engineer against the authority of the commanding officer or the prompt obedience to a signal from the bridge, even if that signal be made by the powder boy; but he, nevertheless, feels that he has been defrauded of proper consideration, that his corps has been cut down without reason, and that he has never been allowed to develop, unhampered, the highest efficiency which can be obtained in our ships.

The attitude of the line officers may be gathered from a few extracts taken from a paper, prepared in 1888 for a line committee, by Lieutenant S. A. Staunton, and presented to Congress:

"The line officers of the Navy are the military branch. They carry out all executive and responsible duties in ships and squadrons, and are respon-

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sible to the country for their preparation and readiness for action. His (a line officer's) training is purely military, and in his early manhood he finds himself fitted for nothing but a naval career. A naval engineer occupies a place radically different. All that is demanded from him is fair knowledge and skill and careful performance of duty. Engineers in the navy have at no time the responsibility of independent judgment which at any moment may fall upon the officer of the watch when in an emergency, with no time for reference or advice; he must decide at once to save the ship entrusted to him from loss or injury. Furthermore, the occupation of an engineer is not peculiar to the naval service. He takes employment in the navy as he might take employment in a steamship line, or with any other private firm. The line offers a career, while the engineer corps does not. A line officer rises, however slowly, to positions of dignity and trust, and enjoys all the social and official considerations which pertain to them. The engineer at sea begins and ends in the engine-room and never enjoys those gracious advantages to the same extent."

When one considers that the line officers and engineers are educated together at the Naval Academy, taking the same military drills and largely the same course of studies, one can understand why such theories as the above carried into practice should tend to drive every engineer out of the service. The engineers very properly feel that they have the same interest in the country and the flag as other officers, that the emergencies below decks are far more frequent than those above decks. The record of broken shafts is a long one and the detentions at sea from accidents to machinery are familiar to all. The judgment and skill which prevent accident, or deal with a break when it occurs, are fully equal to those required on the bridge in steering a ship. So far as the emergencies in action are concerned, there is little to choose between the gun deck and the fire room. No part of a man-of-war in action can be said to be safe. Even the chaplain may suffer the same fate as a combatant. Little needs to be said on the subject of a naval engineer's career when we consider that the speed of our ships is one of their chief glories. Almost all the machinery which produces this speed is designed by the naval engineer. If he has no career in the navy so much the worse for the service and our country.

Fortunately for the country, Mr. Staunton's theories do not prevail throughout even the line of the navy. The social relations on board ship are usually harmonious, and affectionate memories between line and staff often survive long after a cruise of three years. There is, however, a lack of uniformity in methods on our ships which tends to reduce efficiency. In some cases, the hands of the engineer are so tied by absurd regulations, especially

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in the control of his men, that the engineer's force is disorganized; in other cases there is an exercise of good sense which transcends even the naval regulations. The boilers, which form the vital part of a ship, usually suffer most from the lack of co-operation. They are often treated like mere salt water tanks. The interference in mechanical matters by men of no mechanical training would not be tolerated in the merchant service. If, as is fairly claimed, the exigencies of the naval service make it necessary that the commanding officer should have entire control over everything in a ship, including machinery, his education should begin as an engineer, so that that control may at least be intelligent. As a matter of fact, the only men on board of merchant and naval steamers who under modern conditions cannot be spared are the engineers; for without the power to go, our ships would become the playthings of the waves and of no more use in coast defence than derelicts.

The only logical outcome of the present condition of the navy, where the engineers have too few men to enable the ships to run full speed after an enemy and the deck force too few to fight him after catching him, is to fuse the two forces into a homogeneous body of men, so that the greater part of the crew may work at the engines when steaming and at the guns when fighting. This would have come about long ago but for the steady determination that the engineer should have no part in the military organization. He has to-day only what has been yielded to him because of absolute necessity.

Several bills have been introduced into Congress for the improvement of the *personnel*. One of these deals with the engineer corps. It provides for an increase in numbers, for definite military rank instead of the present assimilated rank, for a better definition of command over the engineer's forces, for placing the design and management of all machinery under a Bureau of Engineering, which is to take the place of the present Bureau of Steam Engineering, and finally for making appointments from the enlisted force and from civil life to the Engineer Corps of the Navy. This last feature of the bill may prove of immense importance to the country in founding a great engineering reserve, as it provides for taking on board our ships every year a number of graduates from Technical Schools. They are expected to serve two years, and then to stand a competitive examination for commissions in the

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navy. As only existing vacancies are to be filled, the great majority of them would at the end of two years be mustered out of the service and become members of a national reserve. This seems to be the true way to form a naval reserve, by beginning with the schools. There is safety in numbers and the more our people understand about the technical details of naval and military affairs without actually being members of an organization permanently under arms, the more certain will be our defence, and that, too, without the dangers to civil liberties attendant upon great standing armies and huge navies. There is another side to the question, in the great benefit to our Scientific Schools in the uniformity of method that would follow. A yearly examination set by the officers of the government, or a commission of scientific men, would form a standard toward which all could strive. The system would pay a hundred fold simply as an investment for the industries of our country. In these days of keen competition it might add materially to our success in trade with foreign countries by lifting the standards of schools, thus giving the young men entering our shops better preliminary training. Many private institutions could supply graduates well equipped for the duties on board ship. They would lack the military setting up obtained at the Naval Academy, but they would have in compensation a broader and more liberal education. There would be little difficulty in adding to the Scientific Schools instruction in Marine Engineering, particularly on the seaboard. One good effect would inevitable follow from bringing the schools into closer contact with the navy. The people all over the country would take a greater interest in our ships and also in the growth of a merchant marine.

IRA N. HOLLIS.

IV

I AM asked to write on the engineer in naval warfare; on repairs to war vessels during the progress of war and immediately after; on the means of securing speed in repairs to steam war vessels in time of war, and on the desirability of having the great engine-building shops of the country, especially those near the seaboard, the great lakes, and the Mississippi, converted into auxiliary naval repair stations in war time.

No more important subject could be presented to the serious

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thought of our countrymen. A valuable service to the nation is being rendered by this REVIEW in dispelling the apathy so generally manifest, and in helping to clear away the dense ignorance of the great mass of American citizens on this subject, which should receive the serious consideration of the Navy Department and of the Congress. In order to fit engineers for the onerous and responsible positions they will be obliged to assume, it will be necessary not only to increase their education, but it will also be necessary to open new and subordinate schools for their preparatory education. Departments of steam and naval engineering should be provided for by the government and the States in all the various State colleges organized under the Hatch act.

The Squire-Wilson bill now before Congress, to increase the usefulness and numbers of the Corps of Naval Engineers, and to establish an experimental station for the investigation of problems connected with naval construction and engineering, is a move in the right direction and should become law.

As Professor Hollis, himself for many years an engineer in our navy, says: "It is directly in line with a fuller recognition of engineering as a profession worthy of the respect and rewards due from a great nation whose material prosperity and industrial growth have been made possible by the engineer."

In addition to this, the act relating to the Naval Reserve Corps should be made more thorough by an amendment providing for the enrollment of engineers and machinists in each State or district. In case of emergency, our navy would thus be provided with the means of calling into service those who would be needed, and of putting the right men in the right places, to serve while needed by their country. The crisis passed, they could return to civil life and to the practice of their calling in the various private manufacturing establishments and machine shops where they are now efficiently at work.

From the graduates of young engineers in these departments, after they have taken their college degree, picked men should be sent to a naval college of applied engineering, or to such a department in our naval college where these young men should not only receive a finished technical education as sailors, but also as engineers of the first rank, in all the various fields of engineering, and they should also receive there the benefits of a liberal education, such as is already provided by the government

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at West Point and Annapolis. Such graduates as these would soon scatter forever the common prejudice felt by officers of the line against the engineering department.

It is easy to see that from the class of engineers thus created, and especially from the young men thus at work in the various State colleges, in addition to the body of engineers already in existence and those training with the same end in view at the various technological schools, we should be providing the brains that will be able to repair war vessels in time of war.

From the results of the naval battle at the Yalu, between the Japanese and the Chinese, we have learned that in future sea battles great havoc will be wrought to both fleets. That force which can the soonest repair the damages of such a contest can strike a blow upon its antagonist while still in a disabled condition. It is clear that such a power will in the end conquer.

Thus we see that besides possessing the strongest battle-ships we must also be in a position to repair damages the first. Not having the powerful navy of the English, we are all the more dependent for final success upon our facility in repairing damages during action and immediately thereafter. To do this we must provide the necessary plants, and also the means of setting such plants in immediate operation.

The exigencies of modern war are recognized to be such that speed in such repairs at such a time must be secured at whatever cost. In order that we may then use speed, the right conditions must be prepared beforehand. We should begin by selecting a landlocked bay, capable of protection from the enemy at its mouth; of course with deep water and, necessarily, in that part of the country where mechanical skill is accessible. Several such sites should be chosen on both sides of our mighty continent, on the Mississippi River, and on the great lakes. Owing to the absence of harbors on our Pacific coast, and the difficulty of procuring coal, it would be almost impossible to blockade it. It is also beyond the reach of European countries, and we may, therefore, address ourselves more particularly to the question of naval warfare on the Atlantic coast and Gulf coast. Narragansett Bay, as one site, fulfils these conditions. Its mouth could easily be defended against entrance by the enemy's fleet. Our entire navy, if necessary, could ride securely upon its waters, while it is di-

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rectly and immediately connected by inland communication with every centre of mechanical industry on the Eastern coast, to say nothing of the mechanical ability and the manufacturing facilities of Rhode Island itself.

On this coast we find only five navy yards with repair plants. These are Portsmouth, Boston, Brooklyn, League Island, and Norfolk. The poor management and bad policy of our government has allowed the plants at Portsmouth, Boston, and League Island to become so obsolete that repairs to modern ironclads could not be made without remodelling these establishments throughout. This leaves but two navy yards for repairs in case of emergency, Norfolk and Brooklyn. In time of emergency there would be no reserve artisans within easy reach of Norfolk, except those in the shipbuilding plant at Newport News, built as a necessity for a great railroad system. Therefore, the capability of this yard for the expeditious repairs of disabled cruisers is very limited. Navy yards should be located near great manufacturing cities where thousands of mechanics can be gathered for an emergency at short notice. If the Navy Department had listened to engineers, the plant at League Island might have been made an excellent repair station. The location is unexcelled, but the tools are not there. Indeed, it is said that there is now an efficient corps of watchmen on duty in this yard to keep interlopers from going over the neglected buildings.

Having thus provided both the brains and the hands necessary to carry on repairs during naval warfare and immediately after a battle, there remains one essential step necessary—to give the President of the United States, as commander-in-chief of the navy, the power to make these resources available beyond peradventure. Although the patriotism of the owners of shipyards and manufacturing establishments is unquestionable, in time of war and under pressing necessity we should not be dependent upon their voluntary action. Power should be vested in the President, in time of war, acting under the advice and consent, perhaps, of his cabinet, under the exercise of eminent domain, to condemn and take for public use whatever manufacturing establishments may be necessary to carry into instant effect the proposed system for immediate naval construction and repairs. Of course, under the provisions of the constitution, the rights of the owners will be amply protected, for they must be paid the full

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value of their property thus taken for public use, and in case of disagreement as to this value, it must be fixed by a jury trial.

In addition to these measures intended to provide for immediate repairs, our fleet should also be furnished with floating workshops or repair-ships. In case of emergency they could be manned by members of the proposed Naval Reserve Corps; for in this fine body of men will be found many skilful artisans. It is not intended that these repair-ships should be floating dockyards, but they should be so equipped as to be capable of being laid by the side of any vessel needing repairs, not of such a nature as to require her to go into a dock, but still of such a nature as to require assistance outside of the vessel herself. For instance, it may be necessary after a battle or an extended cruise, to make general repairs, the result of injuries from forced duty. With such a repair-shop as above indicated, alongside of the cruiser, with the necessary power transmitted directly, these repairs could be immediately and efficiently completed.

It seems hardly necessary to add that in case of a great naval battle at the present day between great rival war vessels entirely dependent upon machinery and steam for propulsion, it would be necessary to provide powerful, fast tugboats, ready at any moment to lie alongside of a disabled vessel to tow her out of danger or into a harbor of refuge, when directed so to do by the admiral in command.

Recent international events, as well as the necessity of protection to our commerce, prove unmistakably that our peace and dignity as a nation can be best preserved and maintained by an efficient navy. Such a navy is also necessary to make ourselves felt in the councils of the great powers when a canal, constructed and controlled by our own government, shall connect and control the Atlantic and Pacific oceans. The important question of building up a good navy, and then of its maintenance in proper condition, has not been adequately considered in our Congress. It is manifest, however, that we have not the means for building modern cruisers, for keeping them in repair, and for repairing them after damage in battle, in any of our national navy yards; nor are these yards properly protected from injury by the enemy in case of war. They are still looked upon as the sport and prey of political intrigue.

The manner of carrying on business by our government in

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these navy yards is not in accordance with modern business and industrial methods. Official routine and red tape, combined with want of proper business methods, cause such delay that, where time is an object, government navy yards cannot compete with outside firms. It is to private firms, therefore, that we must look for relief in time of emergency. We are fortunate in having many industrial establishments, not only upon the coast, but in inland cities within easy reach of deep water, whose plants could be readily adapted to the work and where the repairs would be quickly carried on. Thanks to these engineering establishments and to the genius and ability of the engineers of our country, we can quickly produce any required war material and we can quickly make any necessary repairs in case of injury arising in battle or otherwise. It is to them and to the naval and mechanical engineers we must turn for relief, both before the battle and after the battle. These engineers and the machinists and artisans who under their direction prepare the modern warships for battle, maintain the numerous engines in efficiency during action, and repair damages after the conflict, will be the men through whom success must be largely secured.

It is fortunate we have excellent private machine shops and yards scattered along our seaboard States. Here, again, the pre-eminence of Narragansett Bay is manifest, for it is here we find many of the most skilful mechanics in the country, and manufacturing establishments with various departments under the management of men who rendered valuable engineering services to the country during its last war. On its shores and in Providence any repairs needed for the navy can be speedily done. At Bristol the world-famous establishment of the Herreshoffs, in any emergency, stands ready to devote its services to anything our navy may call for. The Taunton shops are near by. Worcester is but forty-four miles off, up the valley of the Blackstone, and along the whole distance, the traveller is never out of the sound of factory bells, marking the sites where, in case of emergency, the government would find trained engineers and machinists ready to serve their country.

The pre-eminence of Narragansett Bay as a site for our merchant marine, and for the landing of passengers and freight from Europe for distribution throughout the country, has never yet been sufficiently recognized. Between Wickford and Whale

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Rock lies a natural harbor where passengers and freight can easily be landed within two hours of Boston and within three hours of New York. Both this harbor and the eastern passage between Newport and Tiverton are directly accessible to ocean steamers, thus avoiding the intricate channel of Boston, that has so seriously handicapped her as a port. Were these natural facilities taken advantage of by the establishment of suitable wharves, docks, and repair shops for our merchant marine, in time of peace, they would be directly available for use by our government for naval repairs in case of war.

In every-day life, common sense teaches us when we want anything done to go to a man who makes that thing his business, but matters are managed differently in the United States Navy. At the head of a navy yard is a line officer who has been taught seamanship, but who, unless he is also an engineer, has no knowledge of what is necessary to be done to repair condensers, pumps, or separators, and miles of piping, disabled engines, or boilers. This is certainly wrong, and, from a business point of view, a marine engineer of recognized ability should be made director of repairs. Such a man should possess great physical powers, for the work would be of severe character. He should be in touch with men of his profession, and he should be known to have progressive ideas. He should also possess knowledge of the ships and of their machinery. Such a man could call upon the heads of the great manufacturing establishments in this country for assistance in time of emergency. He could learn beforehand what kind and number of men each establishment could furnish him, and also what repairs each establishment could undertake. The patterns for parts that might require duplication should be distributed among these establishments. Just as the great engine manufactories in this country now build their engines, in duplicate interchangeable parts, many at a time, thus reducing cost, so should our government build vessels in duplicate, thus reducing their cost. This system would prove of great service whenever repairs became necessary. Such a director of repairs, with assistance at each repair station, would bring the system into business order.

Trained inspectors should also be supplied to test all construction and repairs, and to pass upon the acceptance or rejection of material. These men should be engineers. Under the present

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policy of the Navy Department, officers of the line are sent to do this work. Many of them are not familiar with the various metals and alloys used, and, in many cases, having had no training as engineers, they cannot understand machinery specifications. The inevitable result is, that both the government and the naval constructor suffer from this system.

It is easy to see that the engineer will play a more important part in naval warfare, and, unless this is recognized, we shall lose in large measure the good we may otherwise derive from our warships. The weapon has changed from the catapult and spear of the galley, propelled by oars, through the matchlock and smooth bore of the sailing frigate, to the battle-ship of the present day—a huge fighting machine whose soul is steam power. A new weapon has come and with it must come a change in the organization of the navy. The naval engineer must be given the standing to which he is justly entitled. Being responsible for repairs on board ship, he must have control over the men who make them. He can only succeed in the prevention of derangement by having the power to supervise all machinery on board the vessel. Next to the commanding officer, the engineer on a modern warship is the most important officer, taking into consideration the duties he has to perform. He and his assistants must, therefore, be given the rank and title that are their due.

We cross the Atlantic Ocean on some magnificent English steamship and learn that both ship and officers are liable to instant call to serve as auxiliaries to the English navy, in case of war. What similar resource have we? Will it do for us longer to remain supinely indifferent, trusting to luck should war come suddenly upon us? It is only in the cases of the last two merchant ships, the St. Paul and St. Louis, we have followed this example.

By the terms of the existing treaty with England, each country is limited to one gunboat on the great lakes. But England keeps in constant readiness, in case of war with us, four gunboats that could reach the lakes through Canadian canals and waterways. Once upon these lakes, before we could build gunboats to meet them, they would control the lakes, every city upon them, and the railroads from the West passing by the lake shores. What measures have we provided to anticipate this possibility?

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The purpose of my few words will be met, if through them I can help in arousing our country to some sense of its present naval inferiority and the means to be adopted to remedy it. To this end nothing will contribute more than the recognition of the importance of the steam engineer in modern warfare. Through him is to be supplied the essential to success in the modern navy—power. Already have we more than doubled the steam horse power of the world in the past seven years. That great man, Gladstone, but voices the recognition of our services when he characterizes steam as an agent that has revolutionized the world. When George III. asked Watt what he had, his answer was prophetic: "I have what every subject of your Majesty wants—Power."

GARDINER C. SIMS.

V.

THE registered and licensed tonnage of our merchant marine comprises 6,919 steam vessels, on which serve 21,006 licensed masters, mates, and pilots, with 17,530 engineers for duties relating to the motive power. In our navy, before the ending of the Civil War, there were 2,463 deck officers and 2,279 engineers. It will be seen that, with the business methods of the merchant service in peace, and for the needs of the navy in warfare, the number of officers below decks is nearly equal to that doing duty above.

The entire force of merchant engineers as given above would not be available in the event of war. Of the ships noted, 4,000 are under 200 tons in size, and are also of such construction that but few of them could be adapted for war purposes. On these steamers there are 8,000 engineers whose licenses do not permit them to take charge of a watch on a sea-going vessel. We have remaining then about 2,500 steamers with 9,000 engineers. While we have no official physical examinations, it is safe to say that, of the latter number, at least one-sixth would be debarred, by constitutional impairments or by injuries received in line of duty, from entering the naval service, which receives only men in perfect health. This would leave, as possibilities for war requirements, a force of about 7,500 licensed engineers.

During the year 1864, the time of its maximum strength, the regularly commissioned navy consisted of about 600 vessels, in-

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cluding about 100 on the western rivers. In addition to these, the Quartermaster's Department of the Army built, purchased, chartered, or otherwise employed about 650 steamers of over 150 tons' measurement; and the other military departments had undoubtedly in their service 150 more vessels of such size. We have, then, an approximate total of 1,400 steamers used by the Northern forces for guarding but a part of our coast-line and for furnishing supplies to the armies. If we should have, in the future, both coasts and the lakes to defend, as well as several armies on the Canadian frontier to supply, it would be but a moderate estimate which would give us 2,500 steamers for all war-purposes.

In the construction, repair and maintenance of so large a fleet as this, the engineers of the merchant marine would have a work which would occupy fully their whole available force. It is not to be supposed, however, that our coasting trade would be completely paralyzed; and, further, war would stimulate, not depress, business on the rivers and a part of the lakes, so that the commercial demand for engineers in these localities would be increased rather than lessened. Again, a great number of our engineers are attached to river boats, and would therefore be likely, if they volunteered, to connect themselves with the military, and not the naval, service. With these facts in view, it is evident not only that the entire available force of merchant engineers would not be employed on war duty, but that also they could, least of all, be depended upon to fill vacant places in the warships of the navy.

A further point must be considered in connection with the presumed availability of our engineers for duty on war-vessels. Although they see and know more of these ships than any other class of our citizens, they are the last to enter the naval service. Despite the substantial pension and other benefits which should result from such a course, with the opportunity for extended foreign travel, the records of our organization show that very few ever enlist in the navy. Its whole system is distasteful to them, founded as it is on the tradition of the past and exalting as it does one class of officers unduly, while it minimizes the importance of the engineer. There has been, and is, an urgent demand for machinists on our warships and the younger members of our organization would doubtless be welcomed, if they cared

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to enter this service. This, however, they will not do and the navy has been compelled, therefore, to secure machinists from the industrial plants—young men who have never been to sea, and who are ignorant of the humiliation and persecution awaiting them. Even these are not always available, and, in some cases, firemen and oilers, who are not mechanics, are, through necessity, advanced to the machinist-rating. Yet, we hear constantly, that, in time of emergency, the engineers of the merchant marine will seek these difficult and dangerous positions, which, in times of peace, have no attraction for them. Very little is said as to the readiness of the masters, pilots, and mates to take the places of the captains and lieutenants of the navy, although they are far better fitted to command the vessels of the transport-service than are the latter officers. A competent commander can be developed in a less time than is required to train a chief engineer; and yet an excess of deck officers is maintained for unexpected emergencies in the navy, while no provision is made for the sudden needs of the engine-room.

Our merchant vessels are not over-crowded with engineers; there are too few rather than too many; and there will surely be no over-sufficiency when, with war, the work grows harder. There are hundreds of tug-boats running with but a single engineer, and official records show that it is not unusual for one of these men to remain continuously in the engine-room for over twenty-four hours, sleeping only when the engines are stopped. There are, in addition, other confirmatory facts which prove that there is an insufficient number of engineers to care properly for the machinery of the merchant marine. The evil of the excessive period of continuous duty above referred to, has been considered by our association, which proposes that it shall be corrected.

We recognize fully that the Corps of Naval Engineers must have a military and scientific training in order to direct the large engine and fireroom forces which are under their control, and to design, construct, maintain, and supervise the working of the numerous and complicated engines, for many varied purposes, which are placed in their charge, and which, for important military reasons, are crowded into unusually contracted spaces on war vessels. It requires special training of a high order for such work; it has cost the government at least $15,000 to educate

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each of these officers, and it would be surprising if they did not possess special attainments. Our own sphere of duty is, as well, a broad and honorable one in peace; and if, in warfare, we shall maintain the machinery of the great transports and privateers in a state of efficiency, we shall do a military work of the highest importance, for the value of a modern fleet will be determined, in a great measure, by the proper service of its auxiliary vessels.

If, despite the facts which have been presented, it is still assumed that our members will, in war, enter the naval service, it seems pertinent to inquire where the trained men shall be found to fill the places they leave vacant. The man who does not know presumes to tell us that the locomotive engineer will be transferred to the ships of the mercantile marine. Will railroads stop running in time of war? Will not their traffic be increased rather than diminished? The men composing the Locomotive Brotherhood possess qualities which make them, as an organization, respected and feared. They must be of strong physique, quick of judgment, fearless in danger, and with all the attributes innate with men of sturdy mental fibre and of good moral character. The locomotive driver is undoubtedly at the head of the artisan classes, but it is not always requisite that he shall have a trade. It has been repeatedly stated in print by leading officials of great railway companies that, in many cases, their engineers are forbidden to carry any but the simplest tools. It is not expected that they shall make repairs, since all overhauling of the parts is done at the terminal stations. On the other hand, the necessities of the merchant service require that those in charge of the engines shall be able not only to manipulate but to repair them. It is apparent, then, that only on a few ships, with simple engines, can the Locomotive Brotherhood relieve marine engineers. That this should be so is not a reflection upon the former; it is but seldom that skilled workers of any class can replace others whose vocation differs from theirs in character.

The only man who seems unaware of these and other existing engineering conditions, within and without his service, is the sailor officer of the American navy. Since he has possessed for a century nearly all of its emoluments and honors, the reform of the naval organization will never take place with his approval; it must come from the Congress.

The distinguished engineer-in-chief of the navy is not only a

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friend, but an honorary member, of our organization. For years, Commodore Melville has studied the problem as to the most effective use of our force in war, and our executive officers have conferred with him repeatedly in regard to it. There can be no better man than he, with his years of experience and his wide knowledge, to suggest a measure which shall utilize for the national defence the service of the Marine Engineers' Association, a body which is powerful both in number and influence. The full measure of its patriotism and of its regard for law and order has been signally shown on more than one occasion. The maritime bodies of Chicago know that it was the conservatism of the marine engineers which prevented the great strike of 1894 from being a success, and which saved that municipality from being turned over to riot. It is needless to state the inducements which were then offered our members to desert their ships and paralyze the trade of that port. Our organization has never attempted a strike. In the conflict between capital and labor, the marine engineers have invariably won. Nearly all of our people have trades; and, if it shall ever be necessary for them to leave their ships, they can earn a living elsewhere and prolong the contest indefinitely.

The tradition and conservatism of the sailor have retarded the development of our naval strength, not only afloat but ashore. The force of the Naval Reserve, as officially stated, is something less than 5,000 men. The rosters of the organizations of the various States show that but three engineer officers have been authorized in the entire complement; and yet the Naval Militia receives national bounty and is under the control of the Navy Department. If these facts were fully known, the national appropriation for this purpose would be imperilled. A naval reserve cannot be efficient which fails to recognize the engineer as an integral part of its force. If, in peace, we are denied entrance to this body, wherein are we fitted for usefulness in war?

The most pressing naval problem is that of providing for the great and sudden expansion of the work of the Corps of Naval Engineers in time of emergency. As with the worthless designs for machinery purchased in England for our navy by officers who were not engineers, so signal failure has resulted always from the attempt of others to do the work of naval engineers, and yet there are too few of the latter in our service. They have been crowded out of our warships to make room for an excess of deck

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officers. Our organization now realizes the power which it possesses. We propose that the Congress, and not the regulations prepared by a few sailors, shall settle the question as to how we shall co-operate with naval engineers. This is under discussion by the 100 local associations which compose our membership.

There should be extended to the navy the system of the merchant marine which gives engineers immunity from the interference of mates on deck. The directors of our corporations find this necessary. With this system in the navy we should hear no longer the complaints as to the unsatisfactory organizations of our war-ships.

There is now before the Congress a measure demanding that none but Americans be placed in the engine-rooms of our naval vessels. This precaution is the due not only of patriotism, but of wisdom, since, when urgent need shall come for these ships, their machinery, at least, will not be manipulated by aliens. In this connection it may be said that, while all steamship lines receiving subsidies assumed in a measure reciprocal responsibilities to the nation, those companies which have been the greatest beneficiaries of this government gratuity are the least inclined to employ American marine engineers.

Of the several bills which have been introduced for the reorganization of the *personnel* of the navy, there is none so important for the efficiency of the service, none so patriotic in its purpose and scope, none so worthy of the nation's knowledge and approval, as the Wilson-Squire Engineering and Educational Bill. From the standpoint of our organization, it is the greatest naval measure which has ever been presented to a Congress of the United States.

As a supplement to this, the Squire–Hopkins Bill, whose object is the increased efficiency of the engineer service of the merchant marine, will add materially to the usefulness of the transports and other auxiliary vessels.

A change is imperative in the organization of our naval service. The Corps of Engineers must receive the recognition which its importance demands. With this change, the mechanical and scientific branch of the navy will offer inducements sufficient to attract the engineers of the merchant marine.

GEORGE UHLER.

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MARS AND ITS INHABITANTS.

BY CAMILLE FLAMMARION.

I HAVE upon my table a good many letters from various countries, inquiring of me whether, in the present state of science, we cannot form some idea as to the conditions of life upon the surface of the planet Mars, and the nature of the beings who might inhabit this neighboring world. I have always hesitated to reply to these letters because the solution of the problem is complex, difficult, and cannot be made entirely satisfactory. But a letter recently received from the NORTH AMERICAN REVIEW does me the honor to press for an answer. It would be ungracious to play the deaf mute. I accordingly comply, and I will endeavor again to discuss, with the aid of the latest lights of science, the question which I have already many times touched upon in my works. These new lights are, however, at best but feeble, and insufficient to warrant anything more than an attempt.

I.

IT IS not that we have not already reached certainty upon many points. Thus, for instance, we know that the years of Mars, almost twice as long as ours, are composed of 686 days, 23 hours, 30 minutes, and 41 seconds, and surely nothing need be more precise. We know also that the duration of day and night, or, to speak more exactly, that of the diurnal rotation, is 24 hours, 37 minutes, 22 seconds, and 65 hundredths of a second. We know further that, since the inclination of its axis of rotation is 24° 52′, the seasons there are sensibly of the same intensity as upon our planet. Besides, with our own eyes we see the polar snows melt during the summer and reappear in the winter.

Furthermore, we know very exactly the geography of this

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neighboring globe, and in this respect there is hardly any more mystery for us than in its calendar. We have observations and detailed drawings of its continents, its seas, its streams, its islands, its capes, the mouths of its great rivers, and its canals—there is not, one might say, a single point upon the surface of Mars which has not been the object of perpetual study on the part of various observers.

Still further; we know also the density of this globe as well as the intensity of gravity upon its surface, and these are two dominating elements in the organization of its living residents. The whole globe of Mars, which has a diameter of about half that of the earth (528 thousandths—6,728 kilometres or 4,281 miles), weighs only 105 thousandths of our globe, or 625,584 quintillions of kilogrammes. The density of the materials which compose Mars is inferior to that of the substances which compose the Earth, in the proportion of 711 to 1,000. If we compare this density with that of water, for example, we find that the mean density of the Earth is five and a half times (5.50) greater than that of water, or in other words, our globe weighs five and a half times as much as a globe of water of the same dimensions. But Mars weighs not quite four times (3.91) as much as a globe of water of its dimensions. Its component substances are then less dense than ours.

Once more, gravity there is much less powerful than upon the Earth, in the proportion of 376 to 1,000; that is to say, that a mass of 1,000 pounds transported to Mars, and there weighed by a spring-balance, would weigh only 376 pounds, and that a man weighing 160 pounds upon the Earth would weigh only 60 pounds upon the surface of this neighboring globe. Here we have absolute data, demonstrated mathematically and indisputable—data with which imagination has nothing whatever to do. Let us now pass on to consider the planet's climates and atmosphere.

II.

MARS is more distant from the sun than the Earth is, in the ratio of 152 to 100. Its distance is 226 millions of kilometres (140 millions of miles), while that of the Earth is only 149 (93 millions of miles). The quantity of heat received from the central luminary of our system is therefore less than half as much

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as here; it amounts only to 43 hundredths of that which we receive upon the Earth.

Are we, then, to suppose that the mean temperature at the surface of the planet is lower than here? It is probable, because, on the one hand, this globe receives not quite half as much of solar radiation as we do; and because, on the other hand, its atmosphere is lighter, more rarefied than ours. Since gravity at its surface is much less than at the surface of the earth (0.376), all bodies then weigh less in the same proportion, and the atmosphere comes under the same rule. If each square yard of the surface of Mars supported a similar atmosphere to ours, the presence of this Martian atmosphere would be reduced in the proportion stated above—that is to say, the barometer on Mars, instead of standing at 30 inches at the sea level, as upon the Earth, would there indicate only 11.28 inches. This is the pressure which we find in a balloon at an elevation of 8,000 metres (26,250 feet), and this elevation is that of the highest mountains. At the summit of Mt. Blanc the barometric pressure is 16.69 inches.

The habitual clearness of the Martian atmosphere is additional evidence of this rarefaction; clouds and condensations hardly ever form in it. Such an atmosphere does not retain the solar heat so well as ours, but permits it more easily to radiate and dissipate itself in space.

It is then *probable* that there the temperature is lower than upon the Earth; but we add immediately that it is not *certain*, because if the Martian atmosphere were constituted a little differently from ours this would suffice to make it operate very efficaciously upon the solar heat, and retain it as in a hot-house.

Water-vapor suspended in the atmosphere keeps in this heat incomparably better than dry air. It is also the same with the vapor of the ethers, sulphuric, formic and acetic, with the vapor of amylene, iodine, ethyl, chloroform, bisulphide of carbon, etc., etc. Extremely rarefied as it is, the atmosphere of Mars might certainly hold in suspension vapors of this sort, and thus maintain upon the surface of the planet a temperature equal to the mean temperature of the Earth, or even higher.

At any rate the difference of climates is not very great: it is doubtless a little cooler there than here—that is all. If the atmosphere there did not behave in the way we have indicated, we should have upon the planet the temperature of mountains

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clothed with eternal snow, and its surface would be perpetually frozen from the equator to the poles. Now, observation proves to us that the climates of the planet are much more temperate. The snow-caps which form around the poles during the long winters—winters twice as long as ours—melt almost completely under the warmth of the summer. This summer heat must then be rather powerful to effect such a fusion. The polar snows of Mars melt even more completely than do our own, either because the heat stored up during the long summer really acquires a very considerable intensity, or because the sheet of snow has very little thickness. We have here a settled fact of observation. During the last summer of the southern hemisphere of Mars between the months of July and November, 1894, we saw, at our observatory of Juvisy, the polar snow-cap shrink from a diameter of three thousand kilometres to four hundred. There remained finally only a mere point, so to speak, a little on one side of the geographical pole.

Moreover, one sometimes, in the winter, observes snowfalls of considerable extent, which likewise melt rapidly. In the month of April, 1890, for instance, Mr. Pickering photographed a fall of snow upon Mars which covered an area of 2,500,000 square miles a surface almost equal to that of the United States.

The thermometry of the Martian atmosphere does not appear to differ essentially from ours, but as this atmosphere is less dense han ours, certain differences follow of necessity. The boiling, point of water, for instance, must be below 212° F., as is the case upon our high mountains, because this point depends on the atmospheric pressure; every one knows that on the summit of Mont Blanc water boils at 184° F. The freezing point on Mars is perhaps not the same as here, since the water there can hardly be identical with ours in chemical composition. Each different substance has its own point of congelation and its own point of evaporation. While water solidifies at 32° F., mercury becomes solid only at 40° below zero; alcohol vaporizes at 172.4° F.; wood spirit at 149.9°; sulphuret of carbon at 116.6°; sulphuric ether at 100°, etc. We must not be in haste, therefore, to infer the identity of Martian meteorology with terrestrial. It may be that snow on that planet is formed not at 32° F., but at a temperature a little lower.

We are accustomed in the climates of the Earth to a definite

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temperature. The mean annual temperature of Paris, for instance, is 50° F., and between summer and winter the temperature oscillates between 32° and 68° F., overpassing these mean limits, however, rather frequently. From the equator to the poles each country of the globe has its own climate, depending upon its latitude, upon its distance from the ocean (which tends to equalize all temperatures), upon its elevation above the level of the sea, upon the prevalent regimen of winds and clouds, etc., etc.

Plants, animals, men live in each climate in a medium with a temperature to which they are accustomed. They feel cold when the temperature falls below this normal mean, hot when it rises above it. But these effects are relative and not absolute. Beings accustomed to live in Siberia, at a usual temperature only a few degrees above the freezing point, get along perfectly well in it, while others living within the tropics consider a temperature of 25° C. (77 F.) extremely agreeable. We make a gross blunder if we assume that the inhabitants of Mars, whatever sort of creatures they may be, must have the temperature of Moscow, of Paris, of Caracas, in order to be comfortable. They may have temperatures entirely different, lower or higher, and yet feel themselves to be under natural conditions, with normal surroundings.

Let us now remark that the Martian meteorology is less complicated and more pleasant than that of the Earth. There the weather is almost always fine, especially during summer. Very seldom are there clouds even in winter. Generally when we are unable to distinguish through the telescope the details of the geographical configurations upon the planet the fault is in our own atmosphere and not in that of Mars. It is very rarely the case that when our atmospheric conditions are good we are unable to see these details. During the last period of observation of Mars in 1894, I, to speak for myself, encountered only fifteen days (from October 10 to 25) when the surface of the planet was veiled by its own atmosphere. Clouds are excessively rare on the surface of Mars, and perhaps exist at all only as fogs or light cirrus : they are not clouds of rain or storm. These veils are very infrequent there while they are perpetual upon the earth. Probably there is not a single day in the year when the entire surface of the earth is uncovered so that it could be satisfactorily observed

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from space. The two planets have two meteorological systems that are absolutely antithetical.

Furthermore, in the rarefied atmosphere of Mars there can be no powerful winds, like the trade-winds and the predominant atmospheric currents which rule terrestrial climates. Occasionally, however, observers have noted long streaks of snow which appear to have been produced by currents in a tranquil atmosphere. Schiaparelli, for instance, observed such streaks (*"trainées"*) in November and December, 1881, around the northern pole, and extending a considerable distance from it. But such things are exceptions. *The normal condition upon Mars is fine weather.*

After what has preceded, we may consider ourselves virtually transported to this little neighbor world with full knowledge of its conditions of habitability. It remains to add a few words upon its topographical and geographical organization, and our "visit" will be finished.

III.

WHILE three-quarters of the globe of the Earth are covered with water, the seas occupy only about half of the surface of Mars. There are no great oceans like the Atlantic, the Pacific and the Indian Ocean: only Mediterraneans, long and narrow. The northern hemisphere is almost wholly dry land. All the seas are situated in the southern hemisphere, chiefly on one side, that which contains the prime-meridian, and between the longitudes of 260° and 60°.

The depressions which are covered with water occupy this region mainly; the opposite hemisphere is a little more elevated. It is somewhat the same upon the Earth, for Europe and Asia extend towards the North, while the great oceans extend southward. But we note upon Mars a very great difference from the Earth besides that of the extent of the seas: it relates to their depth. Not only are the Martian seas less extensive, they are also very shallow. In a great number of places they are hardly more than marshes, sometimes dry and sometimes overflowed. Many tracts along the seashore are at times covered with water and completely inundated. Moreover, at certain moments of most satisfactory observation it seems as if one could see the bottom of the sea. It would probably be no exaggeration to say that over half of the Martian seas the depth of the water is only a few fathoms.

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The mechanism of the distribution of the water in the atmosphere and on the surface of the globe of Mars is not at all the same as here. Here the mechanism is sufficiently simple. All quarters of the globe are covered with water, the evaporation is considerable, the atmosphere is dense, the solar heat removes continually a great quantity of water from the surface of the seas, raises it in the state of vapor to a certain height where it condenses into clouds, and there the winds, which are strong because of the density of our atmosphere, transport these clouds over the continents. Resolving itself into rain or snow, the water thus transported gives birth to springs, to streams and rivers, which return to the ocean the water that had been removed.

Things do not go this way on our neighbor. The evaporating surface of the Martian seas is far less extensive than here. The solar heat there is only about half as much. But on the other hand the seasons are twice as long. The waters, less deep than ours, can become more easily warmed during the summer and evaporate as upon the Earth. The snow can extend itself around the poles during the long winter, and finally the heat of the long summer may be sufficient to melt almost completely the snow-sheet, which doubtless is not very thick.

Direct observation proves that the snow-sheet does melt almost entirely (something which never happens upon the earth) and sometimes very rapidly.

It is this fusion of the snow which rules the water circulation. No clouds, no rains, no springs, no streams, no rivers carry back water of precipitation to the sea.

The snows begin to melt long before the summer solstice (we see it from the earth). This melting produces almost always extensive inundations, which we also see from here. Sometimes hundreds and thousands of square kilometres are overflowed, and the sea coast is pushed forward into the land. Then an ingenious system of "canals" (whatever they may be, natural or artificial) distributes and regulates these waters over the whole surface of the continents. As the water arrives the canals become visible, at first narrow and pale, but soon wide and dark.

These canals may be natural furrows, produced in the very process of the planet's evolution, like the English Channel and the Channel of Mozambique upon the Earth, or they may be grooves excavated by the inhabitants for the distribution of the

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water, or they may be both ; that is to say, natural formations improved by intelligence. What is certain is that they serve to give circulation to the waters, and constitute a hydrographic system of extreme ingenuity. One might object that this fine system does not prevent inundations. No, but it regulates them. It is a "rise of the Nile" controlled and directed.

The periodical inundation caused in each Martian summer by the melting of the snows is distributed far and wide by the network of canals, which constitutes the principal mechanism—if it is not the only one—by which water, and, with it, organic life, can be diffused over the planet's surface. At this time some of the canals appear to be bordered by a darkish fringe, due, without doubt, to some kind of vegetation. The canals of the surrounding region become, at the same time, darker and broader, and cover wide areas. Things remain in this condition until the moment when the polar snows are at their minimum. Melting has ceased. The width of the canals diminishes, the dark regions brighten up, and the continents resume their yellow color. This grand phenomenon takes place over the whole region between the pole and the sixtieth degree of latitude and recurs each season. Over the whole surface of the planet the system of canals is variable. When they are indistinct and their contours become uncertain and ill-defined it seems likely that the water in them is very low, or may have entirely disappeared. Nothing is left of the canal, or rather we see only a yellowish streak, differing very slightly from the surrounding soil. In the months which precede and in those which follow the great northern inundation, about the time of the equinoxes, the canals become double ; in consequence of a rapid change, which is effected in a few days, perhaps even in a few hours, this or that canal is transformed in all its length into two parallel lines, which run with the geometric precision of the tracks of a railway, and follow exactly the direction of the original canal. These new canals have, like the original ones, widths of from fifty to a hundred kilometres, and even more, and are separated by an interval varying from fifty to five or six hundred kilometres. We have here something besides water ; for instance, a rapid vegetation produced by the moisture. From the height of a balloon the prairies, which occupy the slopes on each side of a river, mark out the course of the river, which itself appears like a slender

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thread, hardly differing in color from the green ribbon beside it. The color of the double canals upon Mars varies from black to red, and is easily distinguished from the yellow tint of the continents. The space between them is generally yellow, sometimes whitish. The gemination occurs also in the lakes, which divide into two.

Whatever may be the explanation of these facts, unparalleled upon the earth, we are able to conclude that upon the surface of the planet Mars the water circulates, not by a system of clouds, of rains, and springs as here, but by the melting of polar snows, and by a system of canals, horizontal and intersecting, which distribute it over the whole extent of the continents. Then it evaporates, to be condensed almost entirely in the cold polar regions, which re-collect it in the state of snow.

It is obvious from this entire array of physiological conditions that the world of Mars is a world vigorously alive, offering both analogies and contrasts with our own. In this present state of our knowledge can we scientifically form for ourselves any theory as to the nature of its inhabitants ?

IV.

THIS question of the state of life upon other worlds involves all the sciences, as has been already evident from the preceding discussions. It is a question of natural history, of zoölogy, of physiology, of paleontology, of chemistry, of physics, as well as of astronomy. It invites us first of all to inquire how life made its appearance on our own planet, what are the laws which have directed its development, and why the human race, to which we belong, is constituted as it is. If we consider the aggregate of terrestrial life we notice in it three grand divisions : the inhabitants of the waters, the dwellers upon the ground, and the winged tribes. The forms, the dimensions, and the structure of these different species depend upon the medium which they inhabit, upon their specific gravity, and the manner of their nourishment. The beings which do not eat, as the plants, have no alimentary canal. One can conceive of plants without roots, able to move like animals, and living on air : beings without digestive organs, without stomach, without bowels, resembling us in no respect. This essential difference of structure would not prevent these beings from living, from feeling, or from thinking. That would be evidently quite another world.

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In a medium illuminated by an entirely different light from ours, more distant from a sun, or receiving the rays from a sun of color red, blue, green or violet, or in which the rays were infra-red or ultra-violet, our eyes would not be at all what they now are. The sense of sight would be replaced by another, which would see what now we cannot see. We might not have two eyes in the countenance, but perhaps three, or only one; or even, doubtless, a wholly different kind of visual organ.

Each of our six senses (everybody knows the sixth sense) has been formed and developed gradually since the primordial period of terrestrial life. In place of six we might have seven, eight, ten, twenty, fifty. We have received only those with which *terrestrial* nature has supplied us.

Every form, animal and vegetable, is determined in its medium and by its medium, as the fossils testify clearly and irrefutably. At first the waters covered all the globe, and then there was no terrestrial animal that breathed by means of lungs.

To have wings, that is a very great advantage: the birds hold a rank above us. Upon the earth the progress of thought has been wrought out through the mammals. The lions, tigers, bears, horses, dogs, and apes, the wild men of the paleolithic caves, have all preceded us. If the birds had been worked out to perfection in this progression the human soul would have dwelt in some winged form, instead of being embodied in a form that cleaves to the earth.

Gravity, and the *density* of the *materials* of which they are composed, play a great part in determining the organization of beings. In the bosom of the sea, animals lose a portion of their weight equal to that of the volume of water which they displace, and they can therefore, without much inconvenience, attain the colossal dimensions of the whales. It could not be so on solid ground where the elephants already meet with some difficulty in moving. Gravity opposes a limit to the size of creatures.

It is this which prevents the birds from reaching a stature comparable to that of men. Eagles, vultures, condors seem to be at the limit.

If the attraction of the earth were less powerful our winged tribes might have received a much greater development. In virtue of the unquestionable principle known as "the struggle for existence," these winged creatures, dominating all others,

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would have been the strongest. Progress would have been effected along this line. The superior race, the human race, would have been a winged race. These simple considerations, which it would be easy to extend much farther, are enough to convince us that our human form is essentially terrestrial, and that the inhabitants of Mars cannot resemble us. They are *different*.

Upon Mars, for example, one might suppose, without scientific heresy, that the remarkable lightness of their bodies may have developed the winged race more highly in the direction indicated, and that the inhabitants of this planet may have received the privilege of flight.

Does this amount to saying that, for this reason, they must necessarily have the form of birds? No. The bats, are they not mammals which suckle their young?

Is it saying, then, that we must imagine them under this form? Not at all. May they not rather be like dragon-flies fluttering in the air above the lakes and the canals?

As to this point we can imagine everything and prove nothing. It is even highly probable that the reality is something absolutely different from all our terrestrial conceptions.

On the one hand the lightness of the Martian beings is favorable to their winged constitution. On the other hand, however, the atmosphere is hardly well fitted to sustain them. But still we recall that terrestrial zoölogy furnishes instances of birds, which are very heavy, such as the condors and the vultures, and these are just the ones which fly highest in the most rarefied regions of our atmosphere; they have been observed even above the summits of the Himalayas, the Andes and the Cordilleras at elevations of from 8,000 to 9,000 metres (27,000 to 30,000 feet) where they can still soar freely, thanks to the enormous spread of their wings.

Nor must we lose sight of the fact that a human being weighing 70 kilogrammes (154 pounds) would weigh no more than 26 kilogrammes (56 pounds) if transported to the globe of Mars.

We can also imagine beings chemically different from ourselves. The human flesh, like that of all other living beings (on the Earth), is a compound of carbon with hydrogen, nitrogen, and oxygen. By what authority do we condemn nature to abstain from creating, in other worlds, any other organic combinations than those of carbon? Silicon, for instance: might

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this not have been the basis of another kind of organic protoplasm ?

The Universe is infinite. We are atoms.

Everything leads us to believe that the planet Mars, older than the Earth in chronologic order, more quickly cooled on account of its lesser volume, more advanced in its planetary life, is at present inhabited by beings more intelligent than we, and less imperfect. But what are they ? We need to be able to enter into telephotic communication with them. We do not despair of this, and we believe in progress.

C. FLAMMARION.

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MEN WHO MIGHT HAVE BEEN PRESIDENTS.

BY JOSEPH M. ROGERS.

THE twenty-eighth Presidential election will take place in November. Six months ago it was generally conceded that the Republicans would elect their candidate by a very large majority. While Republicans are still confident, and the State elections of the past three years tend to confirm their belief, recent political events have made the result fairly debatable. Indeed nothing is more uncertain than a Presidential election at any time, and prophecies of political wiseacres are worth little. Four years ago in April there was a general feeling that a Republican would be elected, and this lasted well into the campaign. But Mr. Cleveland was elected by an immense majority in the Electoral College. So great was that majority that it seemed as if the Republican party had gone to pieces, and few scanned carefully the popular vote, which showed that Cleveland only had a minority and not a great many more votes than the Republican candidate.

The Presidential elections of the past are especially worth study at the present time. Few of them were foregone conclusions, and at a time when in theory electors could exercise their personal choice, and when a Congressional caucus dictated nominations, there were some surprising results, and a number of men narrowly escaped the Presidency.

In the Constitutional Convention of 1787 no important question received so little attention as the manner of electing the President. A number of impracticable propositions were put forward. The matter was referred to a select committee, which reported the Electoral College system as detailed in Article II., Section I., of the Constitution. This was accepted almost without debate or dissent. It was intended that this college of wise

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men should pick out the best men for the two offices, and be entirely unfettered in its choice. Curiously enough this feature was the most popular when the Constitution was published, and it has proved the most unsatisfactory. It was amended during Jefferson's administration, but is still the most undesirable feature of the Constitution. The Constitution provides that electors shall be appointed as the Legislatures of each State shall direct. At the beginning the electors were chosen by the Legislature, and South Carolina continued to do so down to the Civil War. Some States early provided for the popular election of the electors by districts, while others adopted the State ticket plan, which is now practised in every State. In 1892 Michigan voted by districts, but the law therefor has been repealed.

Washington was unanimously chosen President in 1789. Only ten States were represented in the College. Rhode Island and North Carolina had not ratified the Constitution, and New York's Legislature had made no provision for appointing electors. Two electors from Maryland and two from Virginia did not vote. In 1792 Washington received the votes of 132 electors from the fifteen States, but again two electors from Maryland and one from Vermont did not vote.

The canvass of 1796 was one of the most exciting in our history. Party lines had by this time become clearly drawn. John Adams was the logical Federalist candidate, but he was somewhat in the position of Benjamin Harrison four years ago. Some of the leaders of the party disliked him. They wanted a candidate they could manage after election, much as certain politicians do to-day. They concluded to take up a Southern candidate for Vice-President, and while the Federal electors North were to vote equally for the two candidates, it was hoped in the South that personal popularity would give the Vice-President enough votes to elect him President. It is to be remembered that at that time the electors simply voted for two persons without naming either for President or Vice-President, and the one receiving the highest, if a majority, was elected President. Thomas Pinckney, of South Carolina, was selected as the ostensible candidate for Vice-President in the hope of pulling him through for first place. Adams soon learned of the plan, and his New England friends in the Electoral College frustrated it by scattering the vote for second place. When the vote was cast Adams had

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71 votes; Jefferson, 68; Pinckney, 59, while 78 were scattered. Pinckney lost 5 votes from Connecticut; 3 from Maryland; 3 from Massachusetts; 6 from New Hampshire; and gained 1 from Pennsylvania over the vote for Adams, while South Carolina gave him her 8 votes, but supported Jefferson also. If the Federalists had all voted for Pinckney he would have been elected President in place of Adams. This was the first real test of the electoral system, and it made a sensation. Indeed it was declared that two electors chosen in the interest of Jefferson voted for Adams. While there could be no legal objection to electors voting for whom they pleased, it was considered a breach of trust to do so.

In 1800 there was another exciting contest. Adams was still personally unpopular with Federalist politicians, and the game of 1796 was tried again. This time the Federalists took up Charles C. Pinckney, of South Carolina, a relative of Thomas, for Vice-President. In Pennsylvania the two branches of the Legislature were deadlocked, and a compromise was effected, by which Jefferson got 8 votes, and Adams 7. Could Adams have received all the votes he would have been elected. Maryland could have elected him with her solid vote, but here the district system prevailed. The expectation was that South Carolina would give eight votes each to Jefferson and Pinckney as in 1796, but this failed, and Burr got the second choice votes. To prevent a Federalist tie a Rhode Island elector voted for John Jay instead of Pinckney. Had the Federalist plans gone through, Jefferson and Pinckney would each have had 73 votes. The actual result was:

Jefferson	73
Burr	73
Adams	65
Pinckney	64
Jay	1

Thus there was a tie between Jefferson and Burr instead of between Jefferson and Pinckney. Then followed days of political plotting disgraceful to the nation. Although Jefferson was easily first choice, Burr was not inclined to concede it, and resolved to stand on his rights as a candidate. The Federalists controlled both branches of Congress, and a number of plans were put forward to defeat Jefferson, now that the Pinckney plot had failed. A Federal caucus decided to elect Burr if pos-

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sible, making the best bargain possible for Federalism in future. But Bayard of Delaware, who cast the vote of his State, refused to abide by the caucus decision, and three other members followed him. A plan was proposed to keep up the contest until after the 4th of March, and in the meantime pass a law by which a Federalist President could hold over. But this was not well received, as it was revolutionary in principle, and, in any event, a second election would result in Jefferson's triumph. In the meantime balloting began in the House, each State delegation casting but one vote, according to the Constitution. Thirty-five ballots were taken without result. Jefferson had eight States; Burr six; and in two States the delegation was equally divided. This was the unvarying result from February 11 to 17. In the meantime the attempt to draw out Burr went on, but the longer it proceeded the more unsatisfactory were the results, and the Federalists finally concluded that Jefferson was the safer man. On the thirty-sixth ballot the contest was decided by a number of Federalists casting blank votes. The result was:

For Jefferson—Georgia, Kentucky, Maryland, New Jersey, New York, North Carolina, Pennsylvania, Tennessee, Vermont and Virginia—10 States.

For Burr—Connecticut, Massachusetts, New Hampshire and Rhode Island—4 States.

Blank—Delaware and South Carolina.

Thus under the original method of electing Presidents, Thomas Pinckney, Charles C. Pinckney and Aaron Burr might have been elected, not one of whom was a candidate for the office. The Constitution was amended in 1804 so as to prevent any such perversion of the popular will, by providing that electors should vote separately for President and Vice-President.

In 1804 Jefferson had a walk-over. The only votes cast against him were: Connecticut, 9; Delaware, 3; Maryland, 2—all for Charles C. Pinckney.

In 1808 Madison had a large majority. Charles C. Pinckney received only 47 votes, while Madison had 122. George Clinton had a slightly smaller vote for the second place.

By 1812 the Federalist party had disappeared from national view, and Madison received 128 votes against 89 for DeWitt Clinton, the latter carrying Connecticut, Delaware, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island,

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and five of the eleven votes from Maryland. The contest was much closer than the figures show. The war question was then rife, and there was great dissatisfaction over the Congressional caucus nomination of Madison, while all over the country there was a feeling that Virginia was getting an undeserved monopoly of the Presidency. Embargo and the war question were the main issues. Had Pennsylvania supported Clinton and a peace policy, he would have been elected. This was not expected, but the Clintonians did expect North Carolina and either Vermont or Ohio. They failed unexpectedly, and another man who might have been President retired to State politics.

In 1816 Monroe carried every State, except Connecticut, Delaware and Massachusetts, whose 34 votes were cast for Rufus King. In 1820 Monroe received every vote cast but one from New Hampshire, which was given to John Quincy Adams. It was said that this elector wished no man to share the honor of unanimous election with Washington.

In 1824 took place one of the most interesting elections in our history, and one that is unique. Of four candidates, all nominally Republicans, none had a majority. The House then balloted, each State casting a vote, between the three highest on the list. The electoral vote was:

Jackson	99
John Quincy Adams	84
Crawford	41
Clay	37

131 being a majority. Adams was easily the best equipped man for the place, and his public services should have insured him the honor. But he was a poor hand in practical politics, and failed to make combinations that would have insured him success. When the House came to ballot, Clay had thrown his support to Adams, not, as now seems certain, as a result of a bargain for the portfolio of State, but the fact that he did receive that reward was made the basis of the scandal that stuck to Clay for many years. On the first ballot Adams received the vote of thirteen States, Jackson of seven, and Crawford of four. The vote did not follow entirely the decision as given by the States at the election, as there was no obligation that it should, the House having been elected in 1822. Of the States that voted for Jackson, he received the vote in the House of all but Illinois, Louisiana, Maryland and North Carolina. The three former

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supported Adams, and the last Crawford. Adams in addition to the States he carried wholly or more than half in the Electoral College, received the votes of Kentucky, Missouri and Ohio in addition to the three States captured from Jackson.

At this election the States in which the people choose electors were more numerous than ever before. Of the popular vote Jackson received 155,872; Adams, 105,321; Crawford, 44,282, and Clay, 46,587. This, however, was a small portion of the voting population. John Quincy Adams was the only President who received a smaller popular and electoral vote than his leading rival. In 1828 Jackson had a greater majority in the Electoral College than Adams had votes, viz.:

Jackson	178
Adams	83

But where a popular vote was taken there was no such disproportion. Jackson received 647,231 votes, while Adams received 509,097. At this election fewer Legislatures chose electors than ever before. Nearly one-half the qualified voters voted directly for electors, so that Adams' showing was by no means contemptible, and but for the Clay scandal and his peculiar temperament he might have been re-elected.

In 1832 Jackson was triumphantly re-elected, receiving 219 votes to 49 for Clay; 11 for Floyd, 7 for Wirt and two vacancies. But the electoral vote was again no criterion of the popularity of the men. The popular vote stood:

Jackson	687,502
Clay	530,189

with 33,108 divided between the other candidates. The proportion was nearly the same as between Jackson and Adams in 1828.

In 1836 Martin Van Buren, the political legatee of Jackson was elected by a large electoral majority, the vote standing:

Van Buren	170
Harrison	73
White	26
Webster	14
Mangum	11

But on the popular vote Van Buren received 761,549, while the combined opposition cast 736,656. Van Buren owed his election chiefly to his enemies. When Jackson was foiled in his attempt to make society receive the wife of Secretary Eaton, a reconstruction of the Cabinet became necessary. Van Buren resigned and was sent as Minister to England. When the election

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of 1832 came on Jackson had broken with Calhoun, and had determined on some one else as a running mate. While Van Buren may have been his choice, it would not have been politic to recall him from the mission he had just begun, and the President was in a quandary. But the Senate was opposed to Jackson; and Calhoun, Webster and Clay resolved to give the administration a slap in the face. Van Buren had been sent abroad during a recess, and when his name was sent for confirmation the Senate rejected it. This meanness brought its just reward, for Van Buren came home, was triumphantly elected Vice-President, and presided over the body that had so recently rejected him. His succession to the Presidency followed, but this would hardly have been the case but for the attempt of his enemies to disgrace him.

In 1840 William Henry Harrison was elected President in the first hurrah campaign in our history. He received 234 electoral votes to Van Buren's 60. The popular vote stood:

Harrison	1,275,017
Van Buren	1,128,702
Birney	7,059

James G. Birney was the candidate of the Liberty party pledged to abolish slavery. Harrison's early death brought to the Presidency John Tyler, who wrecked his party, and provided politics with a term of contempt. Tyler was an accident. The National Convention met at Harrisburg, Pa., in December, 1839. Clay was the leading candidate, and would have been nominated if the ballot had been taken by polling the Convention by delegates, but the Convention adopted a rule requiring each State delegation to choose a candidate, and vote as a unit. Under this ruling Harrison was nominated. Among Clay's ardent supporters was John Tyler, of Virginia, who was so chagrined over the defeat of his chief that he wept bitter tears. The Convention was desirous of placating Clay's friends, and seizing on these tears as evidence of warmest personal and political friendship. Tyler was nominated for Vice-President. It seems likely from all reports that the choice would have fallen on John M. Clayton, of Delaware, but for those tears. If Clayton had been President instead of Tyler, how different might have been the history of the Whig party!

In 1844 Tyler's perfidy made Whig success impossible, and James K. Polk, the first Presidential dark horse, was elected by

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an electoral vote of 170 to 105 for Clay. But the popular vote was closer, viz.:

Polk	1,337,243
Clay	1,299,068
Birney	62,300

Thus of the popular vote cast Polk failed of a majority. But Polk's nomination was an accident. At the Democratic Convention in Baltimore Van Buren was the leading candidate. He led for several ballots, having a majority, but not the necessary two-thirds. But by the seventh ballot his support began to go to Cass, who would probably have been nominated but for adjournment. A combination was made over night, and Polk was nominated next day. But for this totally unprecedented move in politics either Clay or Cass would have been elected President, with chances in favor of Clay. Neither ever won that goal.

In 1848 Zachary Taylor was elected President by 163 electoral votes to 127 for Cass. The popular vote stood:

Taylor	1,360,101
Cass	1,220,544
Van Buren	291,263

Taylor thus fell short of a popular majority, and would not have been elected at all but for the Free Soil diversion under the rejected candidate for the Democratic nomination in 1844. Van Buren did not get a single electoral vote, but he prevented Cass from carrying New York, and this elected Taylor. But Taylor's nomination was a political surprise. He was the first President absolutely without experience in civil affairs, and only his military renown gave him finally the nomination over Clay. Again did Clay and Cass, the logical candidates, fail of the Presidency by unforeseen political complications. In this contest Webster threw away the only chance he ever had for the Presidency. He was offered the nomination for second place but refused it. Had he accepted he would have succeeded Taylor at the latter's death, and such were his conservative views that he might have been elected in 1852 if he had lived, which is quite probable, as his death is supposed to have been hastened by his political disappointments.

In 1852 Franklin Pierce was elected President by 254 electoral votes to 42 for Winfield Scott. The popular vote stood:

Pierce	1,601,474
Scott	1,386,578
Hale	156,149

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Pierce had a small plurality of the popular vote. But Pierces' nomination was again the result of convention machinery, and not of popular favor. At the Democratic Convention in 1852 at Baltimore, Cass, Buchanan, Marcy and Douglas were the chief candidates. But for the two-thirds rule Cass would again have been nominated, but another dark horse in the person of Pierce was trotted out, thus preventing the popular choice between Cass and Scott at the polls. There is little doubt that Cass would have won this year.

In 1856 James Buchanan was elected President by an electoral vote of 174 to 114 for Fremont, and 8 for Fillmore. Pennsylvania and New Jersey turned the scale for Buchanan. The popular vote stood :

Buchanan	1,838,169
Fremont	1,341,264
Fillmore	874,534

Again the successful candidate received a minority of the popular vote.

Abraham Lincoln was chosen President in 1860 by an electoral vote of 180 to 72 for Breckinridge, 39 for Bell, and 12 for Douglas. The popular vote stood :

Lincoln	1,857,610
Douglas	1,365,976
Breckinridge	847,953
Bell	590,631

Lincoln was in a large minority. Particularly conspicuous is the disproportion between Douglas' popular vote and his twelve votes in the Electoral College. Abraham Lincoln's nomination was unexpected in the East. How it was accomplished has been told too frequently to require repeating here. Seward was his chief competitor, and there is no reason now to believe he would not have been elected if nominated, as was anticipated by his friends.

Leading men in the Union party movement have claimed that the election of Lincoln was largely due to the diversion of Bell and Everett votes in the South from Breckinridge. This on its face is not demonstrated, as the Breckinridge and Bell votes, together with the States which the latter saved to Lincoln, would not have elected Breckinridge. The further claim is made, however, that the Bell and Everett ticket strengthened Lincoln, because it kept many Northern people from supporting the Southern candidate as they had done in 1856, believing that a

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compromise with the South was essential to the preservation of the Union. There is some merit in this claim. Lincoln had the smallest percentage of the popular vote of any President ever chosen by the Electoral College. He was triumphantly re-elected in 1864, but Johnson was an accident. The nomination for Vice-President was offered to General Benjamin F. Butler, who declined it.

Grant was twice overwhelmingly elected, but there were vacancies in the Electoral College each time. The Hayes-Tilden contest is too recent to need reviewing. But Blaine would probably have been nominated in 1876 had not the gas been turned off in the Convention Hall. Garfield, who was the darkest of dark horses, owed his election to the efforts of Grant and Conkling, Arthur became President solely through the favor of Conkling, who secured his nomination as Vice-President. General Butler in his memoirs says that thousands of votes cast for him in New York in 1884 were counted for Cleveland. If true, Mr. Blaine was really elected, as the Democratic majority in the State was only about 1,200. Blaine could have been nominated almost without opposition in 1888, and possibly could have been elected, thus, like Clay and Cass, narrowly missing the Presidency three. times.

This account shows that the following men came within an ace of the Presidency: Thomas Pinckney, Charles C. Pinckney, Aaron Burr, DeWitt Clinton, Henry Clay, John M. Clayton, Daniel Webster, Lewis Cass, Benjamin F. Butler, James G. Blaine, and Samuel J. Tilden.

These Presidents were either accidents of politics or barely gained election: John Adams, Thomas Jefferson (first term), James Madison (second term), John Quincy Adams, Martin Van Buren, William Henry Harrison, John Tyler, James K. Polk, Zachary Taylor, Millard Fillmore, Franklin Pierce, Abraham Lincoln (first term), Andrew Johnson, Rutherford B. Hayes, James A. Garfield, Chester A. Arthur, Benjamin Harrison (owing to Blaine's declination), and Grover Cleveland (first election).

Indeed, the only Presidents ever elected who were the leading choice of their party before nomination were: Washington, Jefferson, Madison (first term), Monroe, Jackson, Lincoln (second term), Grant, and Cleveland (second term).

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In the thirteen Presidential elections since 1840 a winning candidate for the Presidency has but once polled 50 per cent. of the whole vote excluding the three elections 1864–72, when some of the States did not vote. The exception was Pierce who polled 50.9 per cent. William Henry Harrison polled less than 53 per cent., but would have had less than 50 per cent. probably, had South Carolina chosen electors at the polls. In 1836 Van Buren polled 50.83 per cent., but the Tribune Almanac estimated a Whig majority of 30,000 in South Carolina, which would have put him below 50 per cent.

The Electoral College is based on 357 units of population, to which are added 90 units representing states, or 447 in all, thus the voter casts on an average about $1\frac{1}{4}$ votes. In the next election there will be 447 electoral votes cast. Fifteen states have no more than four votes. These represent about six per cent. of the population, and twelve per cent. of the electoral votes. Thus each voter casts 2 votes instead of $1\frac{1}{4}$. Illinois with a slightly greater population casts only 24 electoral votes, or less than 6 per cent. of the whole. New York and Missouri cast the same number of votes as the fifteen small States, but represent 14 per cent. of the population. Wyoming casts $\frac{1}{148}$ of the electoral vote, but represents less than one-thousandth of the population, so that each voter has practically seven votes, making no account of the female vote. The following table shows the figures above given (Utah is included as it votes this year) :

	Electoral Vote.	Population. 1890.
Colorado	4	412,198
Delaware	3	168,493
Florida	4	391,422
Idaho	3	84,385
Montana	3	132,159
Nevada	3	45,761
New Hampshire	4	376,530
North Dakota	3	182,719
Oregon	4	313,767
Rhode Island	4	345,506
South Dakota	4	328,808
Vermont	4	332,422
Washington	4	349,390
Wyoming	3	60,705
Utah	3	207,905
	53—about 12%.	3,732,170—about 6%.
Illinois	24 " 6%.	3,826,351 " 6%.
New York	36	5,997,853
Missouri	17	2,679,184
	53 = 12%.	8,677,037 = 14%.

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The election this year will be peculiar in many respects. While the Republicans have, in the last three years, carried thirty-four States, representing 344 electoral votes, and the Democracy has retained only nine States casting eighty-nine votes, the chances this fall do not run in this ratio. Many cool-headed politicians think the Democratic party has a good chance to win under certain conditions. This table will be found interesting in making computations:

	Electoral Vote.	Electoral Vote. 1892.			Since 1892. State Elections.		
		D.	R.	P.	D.	R.	P.
Alabama	11	11	..	..	11	..	..
Arkansas	8	8	..	..	8	..	..
California	9	8	1	..	..	9	..
Colorado	4	..	..	4	..	4	..
Connecticut	6	6	..	..	..	6	..
Delaware	3	3	..	..	..	3	..
Florida	4	4	..	..	4	..	..
Georgia	13	13	..	..	13	..	..
Idaho	3	..	..	3	..	3	..
Illinois	24	24	..	..	..	24	..
Indiana	15	15	..	..	..	15	..
Iowa	13	..	13	..	..	13	..
Kansas	10	..	..	10	..	10	..
Kentucky	13	13	..	..	..	13	..
Louisiana	8	8	..	..	8	..	..
Maine	6	..	6	..	..	6	..
Maryland	8	8	..	..	..	8	..
Massachusetts	15	..	15	..	..	15	..
Michigan	14	5	9	..	..	14	..
Minnesota	9	..	9	..	..	9	..
Mississippi	9	9	..	..	9	..	..
Missouri	17	17	..	..	..	17	..
Montana	3	..	3	..	..	3	..
Nebraska	8	..	8	..	..	8	..
Nevada	3	..	..	3	..	..	*3
New Hampshire	4	..	4	..	.	4	..
New Jersey	10	10	..	..	.	10	..
New York	36	36	..	..	.	36	..
North Carolina	11	11	..	..	..	..	†11
North Dakota	3	1	1	1	..	3	..
Ohio	23	1	22	..	..	23	..
Oregon	4	..	3	1	..	4	..
Pennsylvania	32	..	32	..	..	32	..
Rhode Island	4	..	4	..	..	4	..
South Carolina	9	9	..	..	9	..	..
South Dakota	4	..	4	..	..	4	..
Tennessee	12	12	..	..	..	12	..
Texas	15	15	..	..	15	..	..
Utah	3	..	..	..	..	3	..
Vermont	4	..	4	..	..	4	..
Virginia	12	12	..	..	12	..	..
Washington	4	..	4	..	..	4	..
West Virginia	6	6	..	..	..	6	..
Wisconsin	12	12	..	..	..	12	..
Wyoming	3	..	3	..	..	3	..
Totals	447	277	145	22	89	344	14

* Free Silver Party. † Fusion with Republicans.

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	Popular vote in 1892.	Percentage.
Cleveland	5,556,562	45.73
Harrison	5,162,874	42.49
Weaver	1,055,424	8.67
Bidwell	264,066	2.17
Wing	22,613	.94

The contest for the Presidency will be unusually interesting this year at the nominating conventions as well as at the polls. For twenty years past until now Blaine has been a candidate at every Republican National Convention with or without his consent. John Sherman has also been a leading candidate several times. This year the Republican candidates are practically new men. Though votes have been cast for Allison and McKinley neither has previously been an important factor in the situation. In the last five Republican Conventions the field has beaten the favorite every time, except in 1892.

The Democratic candidate is more uncertain than the Republican. While the Republican party has by odds the best of the situation, so many elements enter into the problem that Democratic hopes are not without a basis.

So many surprises have taken place at political conventions and at the polls that he is a rash man who dares predict who will be the next President.

JOSEPH M. ROGERS.

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THE OLD TESTAMENT NOT A MILLSTONE.

BY REV. DR. GEORGE COULSON WORKMAN.

THE article entitled "Christianity's Millstone," by Prof. Goldwin Smith, in the December number of this REVIEW, has made considerable stir throughout the continent, and in some communities has created a sensation.

Dr. Smith is a practised writer, as well as an accomplished scholar, and his article is both interesting and stimulating; but his treatment of the Old Testament, with which his essay deals, is disappointing and unsatisfactory.

The aim of the essayist is, apparently, to foster a more rational view of the Scriptures, which is certainly a consummation devoutly to be wished; but the way in which he seeks to accomplish his object is extraordinary. Were a Biblical critic to discuss history as this critic, who is an adept in history, discusses Scripture, the distinguished historian would undoubtedly complain of unfairness, if not of incompetence. No impartial scientist would treat the subjects of his department, or suffer them to be treated, as Professor Smith has treated the writings of the Old Testament.

The method he has adopted is peculiar. Assuming that Biblical inspiration is equivalent to dictation by the Holy Spirit (a theory which no scholar holds), he shows that the Old Testament contains some things which are incompatible with such a view (a truism which no scholar doubts), and then he asks if these things are inspired (a supposition which no scholar entertains). Pursuing this plan throughout his article, he presents, perhaps, the most misleading, if not the most mischievous, critique of the Hebrew Scriptures that has ever been written by a reverent, religious scholar; so that to the superficial reader his

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essay seems like a formidable arraignment of the Old Testament, whereas it is simply an arraignment of an obsolete theory of the Old Testament. That is to say, he arraigns the difficulties connected with an old-fashioned view of Scripture, which a recent, but truly evangelical, review removes.

To use the results of criticism, as Dr. Smith does, to arraign the misconceptions of traditionalism, without showing the elements of truth which the latter contained, is as unwarrantable as to take the established facts of chemistry to demolish the absurd superstitions of alchemy, without showing the important service which it rendered in the development of the more perfect science. By such an unfair use of facts, a modern specialist could make almost any ancient department of knowledge appear ridiculous.

The occasion of this elaborate essay, it appears, was an address, delivered before the members of the recent English Church Congress, at Norwich, England, by Professor Bonney, Canon of Manchester, who made a few harmless but unhappy remarks respecting the true character of certain parts of the Old Testament, which Dr. Smith considers "a bold and honorable attempt to cast a millstone off the neck of Christianity by frankly renouncing belief in the historical character of the earlier books of the Bible."

Taking as a text this statement, which is worth repeating here, Dr. Smith suggests that, in order consistently to make such an acknowledgment, the author of it must renounce certain unworthy conceptions of doctrine which there is no reason to suppose he holds.

> "With the historical character of the chapters relating to the creation," says the essayist, "Canon Bonney must resign his belief in the fall of Adam; with his belief in the fall of Adam he must surrender the doctrine of the Atonement, as connected with that event, and thus relieve conscience of the strain put upon it in struggling to reconcile Vicarious Punishment with our sense of justice. He will also have to lay aside his belief in the Serpent of the Temptation, and in the primeval personality of evil."

Professor Smith is too profound a student not to know that the account of the Fall in Genesis, which was once regarded by theologians as literal history, is now regarded by Christian scholars as religious allegory, an allegory, like a parable, being a form of narrative employed by the sacred writers to illustrate and inculcate spiritual truth. This portion of Scripture is an allegorical or a parabolical representation of the beginning of moral evil in human nature.

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Interpreted in harmony with its figurative style, the account contains neither irrational doctrine nor unhistoric fact. Inasmuch as the doctrine of a personal devil does not belong to Mosaism, and does not appear in the Old Testament before the time of the Exile, the best interpreters of Genesis do not hold that the story of the Fall teaches the primeval personality of evil. "The story apparently presupposes an ungodly principle which had already entered the world," says Oehler, "but does not give any further account of it." Inasmuch, too, as the serpent was used, from prehistoric times throughout the East, as an emblem of an evil principle in the world, a true interpretation of the account does not require us to believe in the actual appearance of a tempting serpent.

While Paul uses the familiar form of Genesis in introducing the doctrine of Atonement, and, in that sense, connects it with the fall of Adam, the Apostle really connects the doctrine with the entrance of sin as a moral fact into human nature. Consequently we are not required by anything in Scripture "to reconcile vicarious punishment with our sense of justice," because the New Testament writers nowhere represent God as punishing Christ for the sins of men. They simply represent Christ as, in loving obedience to the will of his Father, effecting the reconciliation of man to God.

Neither Canon Bonney, whose words have been so strangely used, nor the editor of *Lux Mundi*, whose views have not been fairly represented, needs anyone to hold a brief for him; but when, referring to certain mythical or traditional materials out of which the latter writer admits that some parts of the Old Testament were developed, Dr. Smith says, "It is difficult to see how myths can in any sense be inspired, or why, if the records are in any sense inspired, the Church should not be able to insist on their historical character," he must know that the writer in question does not assume that myths are inspired. He simply regards traditional narratives, such as those presented in the earlier chapters of Genesis, as containing "great inspirations about the origin of all things—the nature of sin, the judgment of God on sin, and the alienation among men which follows their alienation from God,"—inspirations "conveyed to us in that form of myth or allegorical picture, which is the earliest mode in which the mind of man apprehended truth."

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In close connection, when the essayist asks, "Is it conceivable that the Holy Spirit, in dictating the record of God's dealings with mankind for our instruction in the way of life, should simulate the defects of human evidence?" he knows very well that such a supposition is as unworthy as it is irrational. He knows, too, that no scholar of repute to-day accepts the "dictation" theory of inspiration, because, in the closing paragraph of his article, he speaks of "Verbal Inspiration" as being but "a consecrated tradition." He must also know that, instead of assuming that the Holy Spirit dictated the records of Scripture, or simulated the defects of human evidence in dictating them, the editor of the volume already mentioned expressly says that "the recorders of Israel's history were subject to the ordinary laws in the estimate of evidence, (and) that their inspiration did not consist in a miraculous communication to them of facts as they originally happened." Holding with other Christian scholars that Biblical inspiration refers to the spiritual or divine element in the Scriptures, the same writer further says: "The inspiration of the recorder lies primarily in this, that he sees the hand of God in the history and interprets his purpose."

Moreover, when the essayist suggests that "the first step towards a rational appreciation of the Old Testament is to break up the volume, separate the acts of Joshua or Jehu from the teachings of Jesus, and the different books of the Old Testament from each other," he must certainly know that what he so sagaciously proposes is just what Christian teachers are doing, and just what they have been doing for a great many years. Modern scholars do not put all the books of the Bible on the same level, or attach to all parts of it the same importance.

In view of these well-known facts, it seems scarcely fair of the essayist to say, "We have forcibly turned Hebrew literature into a sort of cryptogram of Christianity," as though respectable scholarship were still pursuing such a foolish course. It is a good while since the Song of Songs, which all reputable scholars now regard as a lyric poem intended to display the triumph of pure affection over the temptations of wealth and rank, has been turned by intelligent interpreters into "a cryptogrammic description of the union of Christ with his Church."

Biblical scholarship is not in such a deplorable condition as Dr. Smith's article implies. It recognizes all the difficulties,

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moral, historical, or theological, that really exist; but it sees a way by which, in every instance, the difficulty may be explained in harmony with the claims of Scripture, as well as with the claims of reason.

The following analysis will let the reader see how unfair to the Hebrew Scriptures Dr. Smith has been.

1. He criticizes the unhistoric character of the Old Testament record. Speaking of the mythical or traditional features of the subject-matter of the book of Genesis, he says: "The history of every nation begins with myth. A primeval tribe keeps no record, and a nation in its maturity has no more recollection of what happened in its infancy than a man of what happened to him in his cradle."

This statement is unquestionably true, but its implication is misleading. A myth is not a falsehood, much less an imposture. It is a presentation of truth in fictitious or rather tropical form. As the editor of *Lux Mundi* says:

> "It is a product of mental activity, as instructive and rich as any later product, but its characteristic is that it is not yet distinguished into history, and poetry, and philosophy. It is all of these in the germ, as dream and imagination, and thought and experience, are fused in the mental furniture of a child's mind."

The narratives of Genesis, however, cannot properly be called myths. The earlier ones express the world's best traditional conceptions, at the time when they were compiled, respecting the origins of things; and they embody, in tropical form, not only important historic facts but also great moral and religious truths. Owing to their age and character, though, it should not be claimed for either the earlier or the later narratives of the Pentateuch that they furnish a perfect modern scientific ethnology, chronology, cosmogony, or synopsis of history, although from them each of these subjects may have derived important aid.

Canon Bonney's admission, therefore, that "the increase of scientific knowledge has deprived parts of the earlier books of the Bible of the historical value which was generally attributed to them by our forefathers," is one which does not at all involve the essayist's conclusions. Our forefathers thought that the first part of Genesis was the oldest piece of literature in existence; but the recent decipherment of the cuneiform inscriptions has revealed another still more ancient literature, one which

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gives us an Assyrian account of the Creation, the Fall, the Flood, and the Tower of Babel, in a form that is shown by its mythological and polytheistic features to be much older than the Biblical account, the latter being a purified and spiritualized and monotheized version of the former.

Christian scholars have recognized for a long time that the ethnological statements of the book of Genesis are imperfect, just as they have recognized that the genealogical tables of the Evangelists are incomplete; but they do not claim that such matters were dictated by the Holy Spirit. They also recognize that the stories of the Flood and Tower of Babel, though having an historical basis, are characterized by a manner of expression which must be interpreted according to the habit of Oriental speech, and that they contain traditional elements which are peculiar to all such ancient accounts. But this latter fact does not lessen the value of either story as a primitive means of imparting religious instruction.

When Dr. Smith, therefore, complains in the language of the editor of *Lux Mundi* that "the Church cannot insist upon the historical character of the earliest records of the ancient Church in detail, as she can on the historical character of the Gospels or the Acts of the Apostles," it is sufficient to reply that the Church does not insist upon the perfect historicity of those ancient narratives which are known to contain traditional elements, and which are also known to have been compiled long after the events recorded are said to have taken place. She frankly admits that, previous to the time at which Abraham is believed to have emigrated with his family into Palestine, we cannot determine with certainty much of the history or the chronology pertaining to the primeval and patriarchal ages, because so little of the early record can be definitely traced to a period at all approaching the events.

2. He criticises the unscientific character of the Old Testament teaching. After mentioning several times the crude conceptions of the Mosaic cosmogony, he says, "The Old Testament is altogether geocentric, and not merely in the phenomenal sense."

That the Mosaic cosmogony represents the earth and not the sun as the centre of the universe, is a fact familiar to the most superficial reader of the Bible; but no fair-minded person thinks

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of blaming Moses for this geocentric view, much less of holding him responsible for it. Up to a few centuries ago, the whole world held substantially the same view. Like every other Scripture writer, the compiler of the book of Genesis shared the scientific conceptions of the age in which he lived, and wrote in harmony with the ideas which then prevailed. Moreover, he does not profess to give us a miraculous history of creation, nor does the Church claim that he anticipated in any way the results of modern discovery.

Supposing the story of creation to be a miraculously revealed account of the origin of all created objects, theologians once believed that the whole universe was constructed piece by piece, that the first man was made directly from the dust of the ground, that the first woman was built out of a rib taken from his side, and that the world was formed in six days of twenty-four hours each. They now recognize, however, that some features of the story are not to be treated literally, but tropically ; and they also recognize that the aim of the writer was not to explain how anything actually came into being, or to tell how long the process of creation lasted, much less to give a complete history of our planet from the beginning, but rather to show that everything owes its existence to the creative energy of God, and to describe the divine adaptation of the earth to be the abode of creatures such as can subsist upon it.

Hence Christian scholars do not "play fast and loose either with words or with science," in order to bring the story of creation "into harmony with what we have learned from geology." They simply take the story for what it is, namely, a popular presentation of the more striking phenomena of creation for the purpose of teaching, not science or philosophy, in the technical sense of these terms, but moral and religious truth. In broad outline, they recognize that there is a substantial agreement between the narrative in Genesis and the teaching of science; and that is all we should expect, as well as all the Scripture, properly expounded, leads us to expect.

But, while the general order of Genesis is such as physical science now accepts, judicious teachers do not maintain that the narrative in the first chapter of the book is perfect geology. On the contrary, they perceive that the writer's description of the Spirit's operations as so many creative acts, occupying so many

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solar days, though having a general foundation in nature, merely represents an orderly progress in the work of creation. Instead of claiming, therefore, that the story of creation coincides in all respects with the results which physical investigation has disclosed, such teachers, recognizing the popular and picturesque character of the account, do not attempt to correlate Genesis and geology day by day.

Since the first chapter of Genesis teaches neither geology nor chronology, there is nothing in it inconsistent with the doctrine of evolution that the world was formed by a gradual process of development in harmony with natural laws, or with the declaration of geology that animal life existed for ages before the human race appeared. That all created things are due to divine activity, and that spiritual death, or separation from God, is the outcome of human disobedience—these are two fundamental facts which the story of creation teaches, and which the testimony of the rocks does not gainsay.

Thus Christian geologists are not driven to the desperate shifts to which Professor Smith remembers that Dr. Buckland "was driven in his efforts to reconcile the facts of his science with the Mosaic cosmogony, the literal truth of which he did not venture to impugn." No competent instructor now finds anything in the story of creation to impugn, since, technically speaking, the account is neither scientific nor unscientific, but nonscientific. The book of Genesis gives us no theory, in the modern use of the term, either of the process of creation or of the origin of the world; it merely connects God with creation in an order founded upon the best conceptions of nature to which the mind of man had then attained.

3. He criticises the imperfect character of the Old Testament morality. Referring to a weak as well as an unwise defence, by the editor of *Lux Mundi*, of the most startling of the so-called imprecatory psalms, he says, "This is the way in which we have been led by our traditional belief in the inspiration of the Old Testament to play fast and loose with our understandings and with our moral sense."

The best expositors do not, in their interpretation of the revengeful imprecations of the Old Testament, play fast and loose either with understanding or with moral sense. While they perceive that, in the majority of vindictive passages, the speaker

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or the psalmist, as the case may be, zealous for the honor of Jehovah, so identifies himself with God that he regards God's enemies as his enemies, and hates them simply because, being evil, they are enemies of good, they frankly admit with Dr. Moll, in Lange's *Biblework*, that Psalm cix. displays a spirit "which is not free from carnal passion."

The true explanation of the revengeful spirit here displayed is found in the difference between the view-point of the law and the view-point of the Gospel—a difference indicated by our Lord's rebuke to his disciples for manifesting the zeal of Elijah, when they desired him to imitate the spirit of the Old Testament dispensation by commanding fire from heaven to consume the inhabitants of a hostile village. Owing to the incomplete development of spiritual ideas under the old dispensation, men's conceptions of morality were necessarily imperfect. Hence the Old Testament characters could not reasonably be expected to speak and act according to the exalted standard of the Sermon on the Mount.

But is inspiration compatible with imperfect morality? Certainly; because, if a man honestly conforms to the highest moral standard of his time, he is a truly moral man. That inspiration is compatible with immorality no rational teacher maintains; but that inspiration is compatible with imperfect or crude morality may be consistently maintained, because, as Dr. Bruce says, "Crude morality is compatible with a good conscience."

Such examples of cruelty and treachery, therefore, as those to which Dr. Smith refers, those which he considers "responsible in no small degree for murderous persecutions, and for the extirpation or oppression of heathen races," were quite in keeping with the vindictive spirit, as well as with the crude morality, of Old Testament times. Such deeds of violence could, doubtless, have been justified by the persons who committed them, in harmony with the highest moral standards which then existed; but a wise apologist does not think of defending them. He simply claims that they should be judged, not according to the complete statements of Christian ethics, but by the crude conceptions of the age in which they occurred.

4. He criticises the inhuman character of the Old Testament warfare. Commenting on the cruelties connected with the settlement of Palestine, and complaining of the inconsistent replies

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which foolish apologists have made to the objections raised by humanity against the slaughter of the Canaanites, he says, "We are in no way bound to believe that God so identified himself with a favored tribe as to license it to invade a number of other tribes which had done it no wrong, to slaughter them and take possession of their land."

True apologists do not attempt to justify the butcheries and barbarities of the ancient Hebrew wars, or to maintain that Israel had a legal right to the land of Canaan. They neither claim that, in conquering the country, the Israelites did but recover their own, nor hold that, having been driven by force from Egypt, they had a right to help themselves to a home where they could find it, by putting all the existing inhabitants to the sword, nor do they fall back upon the simple command of God, justifying it on the ground that the Canaanites were idol-worshippers and consequently ignorant of the true God. They believe it to have been the purpose of Providence that the Israelites should possess Canaan, just as they believe it to have been his purpose that the Puritans should possess New England; but they do not consider Providence responsible for the inhumanities either of Israelites or of Christians.

Instead of holding that "God so identified himself with a favored tribe as to license it to invade a number of other tribes which had done it no wrong, to slaughter them and take possession of their land," modern apologists hold that the Hebrew leaders so identified themselves with Jehovah that they regarded anything done in his name as a divine design. The explanation of this fact is very simple. The Israelites were not a philosophic, but a religious, people. Unaccustomed to philosophical speculation, but impressed with physical phenomena as manifestations of the Deity, they beheld God everywhere and traced his hand in everything Connecting everything directly with God, the Old Testament writers did not duly discriminate between a natural consequence and a divine design. As Bishop Perowne says, "The Biblical writers drew no sharp, accurate line between events as the consequence of the divine order and events as following from the divine purpose. To them all was ordained and designed of God."

Hence the Israelites saw no place for chance or accident in creation. Believing that everything was of God, they naturally

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believed that everything was designed of him. All those expressions, therefore, which represent him as prompting men either to be cruel or to do evil should be interpreted as Hebrew forms of speech that originated in a Semitic mode of thought. Thus the harsher features of the Old Testament are capable of a rational explanation, and, in this sense, of a sufficient vindication. In their conquest of Canaan, the Israelites adopted the methods of warfare that were characteristic of their age; and, impelled by a religious motive, they dealt with their captives in such a way as they believed would, in the circumstances, promote the purest worship of Jehovah and the highest welfare of his people.

5. He criticises the irrational character of the Old Testament sacrifice. Discussing the leading features of Hebrew law, he comes at length to the sacrificial worship of the Israelites; and, though he remarks the absence from the Mosaic ritual of human sacrifice, which was practised even by the polished Athenians, he takes occasion to say that "all sacrifice is irrational."

Many of the heathen conceptions of sacrifice were, doubtless, irrational; but the sacrifices of the Old Testament present a marked contrast to those of the heathen, and express the deepest religious instincts of the human heart. In its devouter moods, at least, the soul of man is drawn by a sort of natural impulse to express in deeds, as well as in words, its obligation of indebtedness to God. That inward prompting which impels a man to offer prayer or praise impels him also to offer sacrifice of some kind, either outward or inward or both. The same instinct that leads him to perform acts of devotion leads him, according to his education and development, to perform acts of service or sacrifice. Strictly speaking, even propitiatory sacrifices are merely symbols of reconciliation and communion between man and God.

In an uncultivated and undeveloped state, man endeavors to establish a relation of reconciliation and communion between himself and his Maker by giving to the Deity a portion of what the Deity has given to him; in a more cultivated and developed state, man endeavors to establish this relation of harmony by consecrating himself and his substance to God. Thus in principle, sacrifice is simply the putting of a part of oneself, so to speak, into that which one devotes to God; and such an act can scarcely be regarded as irrational.

6. He criticises the anthropomorphic character of the Old

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Testament language. Alluding to an event recorded in Genesis which represents Jehovah as appearing to Abraham and as being entertained by the patriarch, he asks, "Why should we force ourselves to believe that the Being who fills eternity and infinity became the guest of a Hebrew sheik?"

Dr. Smith asks this question as though modern scholars interpreted the anthropomorphic language of Scripture literally, whereas he knows that they regard all those expressions which seem to ascribe to God the possession of bodily parts and organs, such as hands and feet, eyes and ears, mouth and nose, simply as symbolic. The application to God, in a figurative way, of terms which properly relate to human beings, is as reasonable, however, as it is natural. In the sphere of representative thought, no religion can dispense entirely with anthropomorphic expressions. In accordance with our mental constitution, divine truths can be neither conceived by us nor conveyed to us without the employment of such figurative language.

When the essayist, therefore, asks, "Why should we force ourselves to believe that the Being who fills eternity and infinity became the guest of a Hebrew sheik?" he is well aware not only that the Old Testament teaches the spirituality of God, but also that the eighteenth chapter of Genesis, to which he here refers, contains an account belonging to a time when it was generally believed that men sometimes entertained angels and even gods, and that consequently the account is to be explained as an anthropomorphic representation of an ancient manifestation of the divine presence. Hence, we are not to infer from the language that the Deity really exists in the shape of a man, or that he actually appeared to Abraham with a human body, and walked and talked and ate with the old patriarch!

7. He criticises the partial character of the Old Testament covenant. Representing the Deity as having "entered into a covenant with the sheik's tribe," as he calls the descendants of Abraham, "to the exclusion of the rest of the human race," he asks, "Can we imagine the author of the universe limiting his providential regard and his communication of vital truth to his creatures by tribal lines?"

Here is a three-fold misconception. In the first place, according to the record in the book of Genesis, the covenant of Jehovah with Abraham was not made to the exclusion of any race, but

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rather to the inclusion of every race. "In thee," or, "in thy seed," the record reads, "shall all the families (nations) of the earth be blessed." The gracious divine purpose of revelation and redemption, which is expressed in so many Old Testament passages, though it has a primary reference to Israel, may be shown to have an ultimate reference to mankind. As set forth in Scripture, the election of the Israelites was simply a conditional choice of a certain people, on account of a special fitness for a certain work.

In the second place, instead of teaching that God limits the manifestation of his providential regard to men by tribal lines, the Old Testament teaches a divine superintendence that extends to all men, so that they all are sharers alike in the care of Providence. The author of Psalm lxv., for instance, represents God as the hearer of prayer, to whom all flesh may come; and the prophet Amos (ix., 7) represents him as having granted the same providential guidance to the Syrians and the Philistines that was granted to the Hebrews.

In the third place, instead of teaching that God limits the communication of his vital truth to men by tribal lines, the ancient Scriptures teach that, while the heathen had some true knowledge of God, relatively it was not so large as that which Israel possessed. The whole tenor of Old Testament teaching is that, so far as its relation to him will permit, God does as much, in his protecting Providence, and by his revealing Spirit, for one nation as he does for another.

8. He criticises the tribal character of the Old Testament religion. Describing the Hebrew religion as a tribal monotheism, although, as he admits, a tribal monotheism of an eminently pure and exalted type, he asserts that "higher than to tribal monotheism it did not rise."

This assertion is singularly inconsistent with the facts of the Old Testament. The religion of Israel started as a tribal monotheism, but it rose to an ethical monotheism. That is to say, the idea of a tribal Deity, who had a special relation to a single people, developed into the idea of an absolute Deity, who has moral relations with every people. In the teaching of the prophets, there is a manifest advance upon the teaching of the Pentateuch respecting the doctrine of God. Many passages might be quoted to show that Israelitism, which commenced as a

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national religion, restricted in some measure to a single nation, developed, with the progress of revelation, into a universal religion, which knows no national limitations, because it rests upon belief in a Supreme Being who is the Saviour of all the ends of the earth. Nehemiah ix., 6, is particularly full and complete.

Continuing his description of the Hebrew religion, Dr. Smith says, "It advanced no further than to the belief that its god was supreme in power as well as in character to all other gods, and thus Lord of the whole earth." This statement is contradicted by the explicit declarations of the prophets, who, from the time of Israel onward, proclaim not only the nothingness of idols, but also the absoluteness of God. The canonical prophets declare emphatically that the gods of the heathen are "no gods, but the work of men's hands"; "dumb idols," which cannot move, much less speak and help. With an equal emphasis they declare not simply that there is no god among the nations like Jehovah, but that there is no god anywhere except him. Hence they represent him as the Lord of the whole earth, not because he is superior in power and character to all other gods, but because all other gods are nothing, and he is God alone.

To this other assertion that the Jew, hampered by lingering tribalism, was unable to "form a conception of the universality and majesty of the moral law such as we find in Plato or in Cicero," one need simply reply that Israel's specialty was not philosophy, but religion. Her representative writers were religious teachers, most of whom lived and wrote before the time when philosophical speculation began to take definite shape in the scientific systems of Plato and Aristotle. Hence we should not look in the Old Testament for abstract statements of reasoned truth, but for practical statements of moral and religious truth. If, however, the Jew could not form a conception of the moral law as high and broad as Plato and Cicero could, he did form a conception of the moral Lawgiver as pure and exalted as they did; and, if his statements of moral truth were not as scientific as theirs, his ideas of moral duty were as adequate. His influence, too, on moral life and character was vastly greater than that of either the Roman or the Greek.

9. He criticises the inadequate character of the Old Testament idea of miracle. After making frequent allusions to the miraculous events recorded in the earlier books of the Bible, he

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singles out "the strange episode of Balaam and his colloquy with his ass," and comments on "the stopping of the sun and moon that Israel might have time for the pursuit and slaughter of his enemies."

The story of Balaam is a traditional account of an ancient angelic appearance, belonging to a time when the idea of animals talking with men was practically universal, and is to be interpreted in harmony with that fact. The account of the sun and moon standing still also belongs to a time when men had no strictly scientific conception either of the nature of a miracle or of the constitution of the universe, so that physical phenomena which would now be called extraordinary would then be considered miraculous. The citation from the book of Jasher, to which Dr. Smith refers, is part of an ancient Hebrew poem, which must be interpreted as Oriental poetry. Hence, consistently with the character of the account, the best modern expositors regard the extraordinary phenomenon it describes as a prolongation of the daylight by the ordinary laws of atmospheric refraction.

10. He criticises the undeveloped character of the Old Testament conception of immortality. "Of a belief in the immortality of the soul," he says, "no evidence can be found in the Old Testament."

This assertion is both ambiguous and incorrect. Immortality, in the fullest sense of the term, is a New Testament doctrine. It was Christ, the Apostle declares, who "brought life and incorruption to light through the gospel." But, while its teaching on the subject is vague and indefinite, the Old Testament does contain evidence of a belief in a future state of being. The Hebrew Sheol, like the Greek Hades, represents, it is true, a shadowy abode of the dead; but neither the Hebrews nor the Greeks supposed that death was the end of personal existence, or that it involved the loss of personal identity. In the Old Testament, death is represented as a sort of sleep, out of which the shades of the departed in Sheol could be aroused into consciousness, as Isaiah xiv., 9–11, plainly shows. The continued existence of man after death is a conception that goes right through the ancient Scriptures. Even the book of Job, whether one uses the revised or the unrevised version, contains the germ of a belief in a future state of fellowship with God, though the conception is not so fully developed, perhaps, as it is in Psalm lxxiii., 24.

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11. He criticises the indefinite character of the Old Testament prophecy respecting Christ. "No real and specific prediction of the advent of Jesus, or of any event in his life," he says, "can be produced from the books of the Old Testament."

This statement is incomplete, and its implication is untrue. It implies that the Old Testament contains no prophecies of a future Messiah which were properly fulfilled in the New Testament Christ, whereas, from the time of Isaiah, the canonical prophets put forth the conception of an ideal Coming One, whom they represent as a ruler, a counsellor, a teacher, and a deliverer or saviour, all of which representations were spiritually fulfilled in Jesus of Nazareth; so that the Evangelists were not "simple-minded," as Dr. Smith says, but sensible-minded, when they found "in the sacred books of their nation prognostications of the character and mission of Jesus," because such prognostications or foreshadowings of him really occur in them. A number of passages set Christ forth in his character, in his office, and in his work.

It is not the Hebrew Scriptures regarded as a sacred literature, however, but these Scriptures regarded as a supernatural revelation, which renders them, in the estimation of the essayist, a millstone to Christianity. "The time has surely come," he says, "when as a supernatural revelation they should be frankly, though reverently, laid aside." Does Dr. Smith not know that the time has long come since the soundest Christian teachers taught that the Old Testament is not a revelation, but the record of a revelation? These Scriptures are now acknowledged by all scholars to be the record of a revelation which was received, during a long period of time, by a large number of men who spoke or wrote on religious subjects, as they were moved by the Holy Spirit, but who made use of a great variety of materials, traditional, historical, and philosophical, according to the fullest knowledge they had, and the soundest judgment they possessed.

Though he rejects the Hebrew Scriptures as a revelation in the obsolete sense which no modern scholar holds, yet, toward the conclusion of his article, he grants that the Old Testament may, so far as it is good, be a manifestation of the Divine. "As a manifestation of the Divine," he says, "the Hebrew books, teaching righteousness and purity, may have their place in our love and admiration forever." In making this admission, he

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allows substantially the very thing which Christian scholarship maintains. If these books are a manifestation of God, they must not only, in some sense, be an inspired literature, but also, in some degree, contain a divine revelation. It is this divine element in them which distinguishes them from all other ancient writings.

In their inner spiritual contents, the Hebrew Scriptures are an organic part of the Christian Scriptures. The divine element in the Old Testament was the spiritual germ from which the Gospel evolved, the rudimental teaching out of which the doctrine of Christ was developed. Instead of being Christianity's millstone, therefore, the Old Testament is rather Christianity's foundation-stone, because it forms the spiritual groundwork, so to speak, from which the Christian superstructure rises, or on which the Christian system rests.

GEORGE COULSON WORKMAN.

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WESTERN FEELING TOWARDS THE EAST.

BY SENATOR WILLIAM VINCENT ALLEN, OF NEBRASKA.

"The time may come, therefore—though heaven grant it otherwise—when the bustling, ambitious, independent West will see that its highest development depends upon the management of its own affairs. To avert such a catastrophe there must be a broader, warmer sympathy than now exists; a more intense spirit of patriotism must be inculcated, and, above all, there must be an unstinted and undying, a genuine and universal, pride in the greatness and glory of an undivided republic."—*Henry Litchfield West, in April number of* NORTH AMERICAN REVIEW.

I HAVE been asked to contribute a brief paper in the nature of a reply to Mr. West's article, from which the above quotation is taken, and especially to discuss the "dissatisfaction of the West with the East, showing what justification there is for such a feeling."

I fully realize that this is a delicate subject on which to write, that it is unpleasant to note the existence of dissatisfaction among the people of one section of the country with those of another, and that whoever attempts to do so, however impartial and conservative he may be in what he may say, will subject himself to more or less unpleasant criticism and be misunderstood. I also think the question is not stated with absolute accuracy, for I believe there is fully as much dissatisfaction among the people of the East with the West as there is among those of the West with the East, and that there is as much cause for asking for the justifying reasons therefor as there is in calling for reasons that justify Western dissatisfaction.

That some dissatisfaction exists in the West with the Eastern people, no one familiar with the truth will deny. It cannot be said, however, to be general, nor does it affect all classes, but it does affect a portion of the people.

I was born in the West, and forty years of my life have been

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spent on the sunset side of the Mississippi. I have, within that time, witnessed that section of our country in the various stages of its development. As a boy I was familiar with it when it was inhabited by the buffalo and other animals indigenous to the latitude. I saw them driven from their homes and civilization take their places. I have seen powerful bands of Indians in the practical control of the country, driven, by force of white settlement and the civilization that followed, further westward, until they are now mere remnants of a once mighty people, living on the bounty and under the supervision of the government, and many of them begging from door to door. I have therefore had an opportunity of observing the growth and settlement of the West and the formation of Western sentiment, while candor requires me to say that I have not had an equal opportunity of noting the growth of Eastern sentiment, although I am familiar with it to some extent.

My experience in public life, and the knowledge I have gained by mingling somewhat extensively with my kind, have convinced me that the dissatisfaction is reciprocal, and that the Eastern people do not feel as friendly to the West and to Western development as they should. It must not be forgotten that there was a time, not many years ago, either, when every Western man spoke of his birthplace as in an Eastern State, and when it might be truthfully said that he was, to all intents and purposes, Eastern, and full of Eastern thought, energy, method, and sympathies. But as those men passed from the stage of action, and their children, who were born in the West, succeeded them, the sentiment changed, and the latter speak of their birthplaces as in Western States. Their education, sympathies, and impulses are Western, and many of them know little of the East by actual travel or contact. Eastern ties are mere matters of family history with them, while their associations and sympathies centre in the States in which they live and in adjoining States. Their relations with the East are, therefore, wholly of a general and business character.

But a few years ago the West was an unbroken wilderness. It required great energy, perseverance and self-denial to develop it. Its settlement and civilization were accomplished amid scenes of indescribable danger, privation and trial. The early Western settler was a hero. He took the lives of his family and

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his own life in his hands, and went among roving bands of savages and, by singular self-denial and indomitable energy, established a home and laid the foundation of the marvellous civilization that followed. Having faithfully and conscientiously performed this prodigious work, and having opened the way to profitable investment of large sums of Eastern capital, he naturally had a right to think that at least in all national affairs he would be treated on terms of equality with his Eastern brethren. Much of the development of the West is due, doubtless, to a large use of Eastern capital; Eastern and foreign money has largely aided in the construction of our railways and materially assisted in opening our mines and farms. It has likewise been instrumental, in some measure, in building our towns and cities, and in these respects we are the debtors of the East. But it should be remembered that the obligation is not entirely onesided. The West thus afforded an enlarged opportunity for Eastern enterprise and capital, and large and secure returns on investments that could not otherwise have been made; and we have, in fact, offered a very fruitful field which the East has cultivated with great profit to itself. The opening of Western farms and mines, under proper industrial and commercial conditions, would be a source of great wealth to those who own them, and would enable the West to contribute largely to the aggregate national wealth, and would be productive of a prosperity that has hitherto been unknown, if Eastern greed could be held in check long enough to accomplish the work.

A sentiment exists in the West that it is the purpose of Eastern money loaners and capitalists to drain our industries of their profits by unfriendly legislation, and that they do not intend to permit an enlarged volume of money, and that by this and like means, it is their purpose to increase the national debt and issue interest-bearing bonds that will rest as a blanket mortgage on the entire property of the country; and our people believe that by the time these bonds mature, the West will be compelled to furnish the larger part of the money for their payment. We feel that, through the operation of a shrinking volume of money, which has been caused by Eastern votes and influences for purely selfish purposes, the East has placed its hands on the throat of the West and refused to afford us that measure of justice which we, as citizens of a common country, are entitled to receive.

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The production of grains and meats fifteen hundred miles from the seaboard is not, under the most favorable conditions, highly remunerative. It is a long haul to market, and by means of exorbitant freight rates exacted to pay profits on watered stocks, a system of virtual confiscation has been inaugurated and the profits of farming have disappeared, and now by striking down silver, one of the principal products of our mines, another great source of profit has been unjustly taken away from us.

The East is wedded to an abnormally high tariff for a distinctively protective purpose; that is, for the purpose of enabling one class of citizens, through the means of high-priced articles, caused by diminishing the natural competition arising from the sale of imported articles, to transfer much of the earnings of all other classes to their own pockets. The Eastern people evidently do not believe in levying a tariff for the primary purpose of revenue, and incidentally for the protection of new industries, or industries that have not been securely established, but on the contrary, for the distinct purpose of creating a limited market with revenue to the government as an incident. It can be easily seen that the people of the West are compelled to purchase their manufactured goods from the East, with low-priced products of farm and mine, and pay the freight both ways, and are thereby put to very great disadvantage.

It may be truthfully said in this connection that a feeling exists among the people of the West, to some extent, that the East has, by unduly attempting to control the Western press, endeavored to create an unwarranted and false sentiment on the tariff, financial and transportation questions, as well as a false sentiment, through the agency of small Western banks, on the money question, that is inimical to the true interests of our country. It is believed in the West that there is a fixed purpose on the part of the East to continue this order of things, and thereby transfer the wealth of the West from the pockets of those who produce it to the pockets of those who have had no hand in its production, and no sympathy with its producers.

Another bond of sympathy formerly existing between the two sections was created by Western youth being sent to Eastern colleges, but this has been broken by the establishment in the West of academies, colleges and universities, of a very high order, that furnish ample opportunity for an adequate

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education of our young men and young women. Formerly, also, our ministers, physicians, lawyers, editors and business men came from the East, but they have, in a large measure, disappeared, and their places have been supplied by men born and educated in the West.

Nor can it be said that the expressions, "rotten Western boroughs," "low mining camps," "ignorant Westerners," "dishonest grangers," "repudiationists," "criminal and vicious classes," applied indiscriminately by the Eastern press to the people of the West, have had a tendency to soften the feeling of dissatisfaction; on the contrary, they have greatly intensified it and widened the breach. A similar sentiment was recently expressed by the President of the United States in an address to a missionary meeting in the City of New York, which the Western people regard as expressive of a hostile sentiment among Eastern people.

But it must be understood that, after all, these evils will correct themselves by intelligent and conservative agitation and at the ballot box. The Western people are neither selfish nor disloyal. They are, on the contrary, extremely generous and intensely American. They believe in the Union of the States and the sacredness of the Constitution, and they will not listen to the advocacy of anything that looks like secession. Suggestions that have appeared in the Eastern press that a sentiment of discontent, bordering on disunion, exists among the people of the West, are untrue and do very great injustice to hundreds of thousands of splendid men who, in the hour of national danger, offered their lives as a sacrifice on the altar of their country, and in the interest of national peace and the truth of history such statements should not be made. I have never known of the existence of a disloyal sentiment, and I do not believe that the people of the West can be provoked into entertaining, much less expressing, a sentiment of disunion. It should not be forgotten that the West is the sleeping lion of this country. It has boundless natural resources, and is rapidly increasing in population. It is inhabited by an intelligent, active, brave and Christian people; a people entirely fearless of consequences in the discharge of duty, and the time is speedily coming when our vote in the national legislature, and our influence in all branches of the government, will be equal, if not

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superior, to that of the East. It is to be hoped that when that time comes, the intelligence, forbearance and patriotism of our people will prompt moderation and justice, and will restrain them from inflicting on the East the great wrongs that have been inflicted on them.

I think I am clearly within the bounds of propriety in remarking that many Eastern young men and young women, from travel and observation, know absolutely nothing of the West and its people. It is not an uncommon thing to meet Eastern men who have made many tours of Europe and who have never seen the grandeur of the Rocky Mountains, or the splendor of the great plains, lakes and rivers of their native land. It may be said that such a person has a right to travel in Europe as extensively as he may see fit, and enjoy European civilization and surroundings if he desires to do so, yet it does not speak well for the patriotism of one who turns from the greatness and the glorious scenes of his own country and the study of his own people, to view and study those of older countries, and thus isolate himself from his country and countrymen and lose sympathy with them and their conditions.

The subject assigned me demands more lengthy discussion than I am able, at this time, to give it. It must, however, be impressed on the minds of the people of the East that the West is rapidly becoming able to care for itself in all respects, and this it will do, not to the detriment or injury of the East, nor to the detriment of any class of the people of our common country, but with justice and moderation toward all. The possibility of secession or disunion cannot be admitted. The United States, under its present constitution, must be preserved for all time. The glory that attaches to the name America, American history, and American citizenship, must be maintained. The blessings that were won in the Revolutionary struggle, and that have been consecrated by the blood of two wars since that great event, must not perish by the madness of the people of any section. Let it be understood now and for all time that no people in the United States are more loyal or more devoted to the cause of the Union, and, therefore, to the cause of humanity, than are the splendid sons and daughters of the West.

WILLIAM V. ALLEN.

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THE UNITED STATES AND GREAT BRITAIN: A REPLY TO MR. DAVID A. WELLS.

BY MAYO W. HAZELTINE.

THE leading article in the April number of this REVIEW, "Great Britain and the United States: Their True Relations," by Mr. David A. Wells, was evidently intended to describe, not what the relations of the countries named actually are, but what in the author's opinion they ought to be. The actual relations of two nations are, of course, defined not by the writings or speeches of private individuals, however worthy of esteem, but by the acts of their respective Executives and Legislatures; and from what is done at any given time by those official representatives of national opinion and feeling, especially if it be done with a close approach to unanimity, their future acts may be reasonably inferred. This will be admitted, no doubt, by Mr. Wells, and he will probably acknowledge, also, that the views expressed by him are at present held by only a very small minority of his fellow-citizens, if we may judge from the manner in which Mr. Cleveland's Venezuela message was received by both Houses of Congress, and by the mass of the American people. While conceding this, he would have us believe that the minority of which he is the spokesman is what Matthew Arnold used to call "the saving remnant," meaning by the phrase a body of men, numerically weak, but strong in intellect and virtue, who may be relied upon eventually to clarify and elevate the whole community. It is the views of this saving remnant which he undertakes to expound at considerable length, and the outcome of his exposition is, that there is no reason why Americans should not regard England with cordial friendship; but that on the contrary we ought to welcome the acquisition by Great Britain of the control

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of the Orinoco, and inferentially, of the Amazon and La Plata river systems, because the South American countries concerned would thereby acquire the blessings of a better government and of free trade.

We purpose to examine, paragraph by paragraph, the article in which these paradoxical opinions are set forth, and to inquire what basis there is for the author's statements of fact, and whether the deductions drawn from them are logically sound.

I.

MR. WELLS begins with the assertion that, "The peoples of the United States and of England are essentially of the same blood, language, religion and political principles." There is no doubt that almost all Americans of both sexes who were born in the United States, speak, with varying degrees of correctness, the English language. It is also true that our political principles were, to a large extent, derived from the same source as those of Englishmen, although it is probable that our debt to Holland is generally underrated. The applications of those principles, however, differ materially in the two countries, not only our federal polity, but our State Constitutions being examples of the presidential type of government, as distinguished from the parliamentary system operative in the United Kingdom. It is not true, however, that "the people of the United States and of England are essentially of the same blood." The infusion of Irish blood which began in considerable volume during the years immediately preceding our Revolutionary War has acquired such enormous proportions since the Irish famine of 1846, that a large fraction of our population must now be recognized as wholly or partly of Irish descent. Even before the thirteen colonies achieved independence the Dutch constituted a large minority, if not a majority, in New York and the eastern section of New Jersey; Germans were numerous in Pennsylvania; there were some Swedes in Delaware and southwestern New Jersey; and a good many Huguenots had settled in South Carolina. When we acquired the Louisiana Territory, most of its white inhabitants were of French, and the rest of Spanish, origin. Since 1848, the inflow of emigrants from Germany has been many times greater than that which came from England to the colonies between 1607 and

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1776. There are now, beyond doubt, more Americans who are, wholly or in part, of German lineage, than there were Germans in the Kingdom of Prussia at the close of the last century. There are more men and women of Scandinavian parentage in the United States than exist in the Kingdom of Norway; there are at least half as many Italians as can be found in the island of Sicily; there are more than half as many French Canadians as were returned by the last Dominion census in the province of Quebec. We understate the truth when, in view of the facts just cited, we assert that not one-half of the 62,000,000 human beings reported by the census of 1890 to exist in the United States could prove themselves to be of pure English descent for the last three generations.

So much for the statement that the people of the United States and of England are essentially of the same blood. Are they of the same religion? It is well known that Roman Catholics are incomparably more numerous in the United States than in England, not only absolutely, but proportionately to the total population. The same thing is true of the Methodists and Baptists. The Lutheran Church, which has a great body of adherents on this side of the Atlantic, has not, to our knowledge, more than a single congregation in England. Neither has the Dutch Reformed Church any representatives in England, although in the United States it is a powerful organization. The Church of England professes to comprehend more than half of the English population, although its claim is disputed by the Dissenters; it is certain that its counterpart in this country, the Episcopal Church, ministers to a fraction of the people which is numerically insignificant.

Obviously, then, we can aver that England and the United States are essentially of the same religion only in the sense that both countries are Christian. It would be more reasonable to compare the United States with the German Empire, from the religious point of view, because in Germany the Catholic factor, although not preponderant, is large, while in the Protestant majority there is a strong Calvinistic element. Of Mr. Wells's primary proposition, there remains, then, simply this, that only in respect of language can the term identity be applied to England and the United States. Even with regard to language, it is at least open to question whether, outside of the New England

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States and a few seaboard cities, divergent tendencies are not acquiring considerable momentum. There is, then, no fundamental reason rooted in human nature by virtue of a community of blood and religion why Americans as a nation should regard England with instinctive sympathy and friendship. That mere identity of language is no guaranty of good will is one of the tritest lessons of history, taught by innumerable civil wars in England, by the wars of religion in France, by the Thirty Years' war in Germany, and by our own war of the rebellion.

II.

DIVERSELY constituted as are England and the United States in respect of descent and of religion and even of the methods of applying political principles, we should expect misunderstandings and prejudices, not to say antagonisms, to occur under the most favorable circumstances, historical and actual. There would be nothing more surprising in such phenomena than there is in the lack of sympathy evinced between Englishmen and Germans. Mr. Wells himself admits that "there is much of popular prejudice among the masses in the United States against England," but he attributes this to three causes, neither of which in his opinion has any moral justification. The greater part of his article is occupied with an examination of these causes, and it is this to which we now invite the reader's attention.

The first cause assigned by Mr. Wells for American prejudice against England is "the memory of two wars with the mother country." He adds that, "In each of these contests, the people of the Anglo-American colonies in the first instance, and the people of the United States in the second, obtained all for which they contended, and the parties and the measures responsible for what happened have long passed into history." If Mr. Wells's comments were warranted by the facts, the memories of the two wars mentioned would have produced no deep and rankling animosity; indeed, the War of 1812 would never have taken place if what he says in the passage quoted about the outcome of the Revolutionary War were historically correct. The Peace of 1783 was far from giving the American colonists all for which they had contended; it withheld from them some of the very things which they recognized as indispensable to the quick healing of wounds and the prompt and firm re-establishment of kindly rela-

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tions between the mother country and the daughter State. They perceived from the outset of their war for independence the strategic importance of the Bermudas and of Canada to their projected confederacy. They knew that those coigns of vantage, if retained by England, would be the source of incessant friction and perpetual menace. They tried, though unsuccessfully, to gain possession of both, and their Articles of Confederation provided for the immediate and unconditional admission of Canada to the Union. There were men in England at the time who foresaw that if the restoration of cordial relations with the former colonies was desired both Canada and the Bermudas ought to be surrendered. Not only was their prescience disregarded, but the forts on the northwest frontier, which the treaty bound the British to evacuate, were long occupied by them; and it is a matter of history that the great Indian outbreak, which involved the disastrous rout of the American army under General St. Clair, was due in a large degree to British instigation. When the Indians in their turn were beaten by General Wayne they took refuge under the guns of a British fort, thereby betraying their reliance upon British sympathy. The odious oppression which American commerce suffered at the hands of England during the first twelve years of this century is set forth with a cogency and emphasis, which few Americans are likely to forget, by Mr. Henry Adams in his history of the administrations of Jefferson and Madison. Mr. Wells is strangely mistaken when he says that by the Peace of Ghent, which put an end to the War of 1812, the people of the United States obtained all for which they had contended. It is well known that the treaty in question left us precisely where we were before, not even the exasperating right of search being renounced by England. The treaty left unsettled the inflammatory questions of the northeastern and northwestern boundaries, and the resultant controversies about the limits of Maine and Oregon kept alive jealousies, suspicion, and resentment, and brought the two countries more than once to the brink of war. Scarcely had the people of the United States begun to forget their irritation at the loss of the valuable tract lying between the Fifty-four-Forty line and the present northern border of Oregon, when the secession of most of our slave States took place, and the governing classes in England made no secret of their satisfaction at the prospective dissolution of the Union.

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Before glancing, however, at Mr. Wells's attempt to palliate that unfriendly demonstration we should note a curious statement with regard to the fundamental wrong which drove the American colonies to separation from Great Britain. "It may not be uninteresting," he says, "to call attention to the fact that the grievance of the colonies which is generally regarded as the prime cause of the American revolution, namely, that the colonists were taxed by the mother country without representation in Parliament, was not in the nature of a special discrimination by the British government against their trans-Atlantic subjects, inasmuch as historical investigations have since shown that at the same time not more than one-tenth of the people of England had any vote for, or personal representation in, the British Parliament." It requires no extended historical investigation to acquaint ourselves with the fact that in 1776 no close approach to manhood suffrage existed in most of the American colonies, any more than it did in England. The colonies did not ask for manhood suffrage; what they said was, that, if they were to be taxed, they certainly had a right to the same kind of representation as was conceded in England, where the right to elect members of the House of Commons was shared by every county, and was distributed among a large proportion of the boroughs. Because representation was confined to only about a tenth of the English people, it obviously did not follow that the American people should have no representation at all. England never offered us a property qualification, whereby about one-tenth of the colonists would have been empowered to send delegates to the House of Commons. So much for what seems to us an unreasonable effort to minimize the capital grievance of our forefathers.

III.

We come now to a second cause which is acknowledged by Mr. Wells to have been "most influential for prejudice against England," namely "the policy of the administration of the British government under Lord Palmerston during the Civil War towards the United States." An endeavor is made to dissuade us from the resentment still felt on that account, by a plea which may be described as one of confession and avoidance. Mr. Wells does not deny that the rupture of the Union was desired by those classes in the British community which then controlled

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and still control the government, the classes, in other words, which monopolize the House of Lords and preponderate in the present House of Commons. He would have us distinguish between the governing classes and "the masses of the the people of England" and "especially the British working people" who he says "followed without murmuring the advice of those earnest and constant friends of the Federal Union—Messrs. Cobden and Bright—rather than that of Palmerston and his Ministry." On this point we need only remark that, when the British working people control the House of Commons and have abolished the House of Lords, it is highly probable that comparatively amicable relations will be established between the British and American democracies. Meanwhile, our feeling toward England as toward every other European country, will be shaped by those who have the power to dictate the words and acts of its legislature and executive. It is true, as is pointed out by Mr. Wells in an attempt to show that the British working people were not powerless, that the motion made by Mr. Roebuck in the House of Commons for the recognition of the independence of the Southern Confederacy was defeated. The defeat, however, was due to a coalition of the Conservatives with the Radicals, and this temporary coalition was brought about because it was known to the leaders of the Conservatives, who as a body were quite as hostile to the American Union as were the Palmerstonians, that a recognition of the Confederacy's independence at that juncture would have caused a declaration of war on our part, and that in such a war we were assured of the support of Russia. That to give us such support was the intention of the Czar, Alexander II., is now known to every one familiar with the diplomatic history of the period, and both at London and Paris it unquestionably turned the scale in our favor. That Palmerston and the majority of his colleagues, including conspicuously Mr. Gladstone, longed for a specious pretext on which to interpose by force on behalf of the Secessionists, was proved by the eagerness with which they seized on the excuse afforded by our exercise in the case of the steamer "Trent" of the right of search, the very right which England had refused to renounce in the treaty of Ghent. It is probably true that Queen Victoria used her personal influence to prevent too much being made of the "Trent" incident, but the fact manifestly does not weaken the ground of our dislike of the governing classes.

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When Americans say that they detest England, they mean that they detest the part of the English community which for two hundred years has, ninety-nine times out of a hundred, had the power to determine England's action. They do not think that a feeling justified by the almost unbroken history of two centuries should be materially qualified because, once in a reign of nearly sixty years, the Queen is said to have interposed in their behalf, or because they have now and then commanded the sympathy of the British working people, which from a political point of view has usually proved a negligible factor. As for another statement made by Mr. Wells in reference to our civil war, it is certainly true that the action of the French Second Empire stopped little short of actual hostility against the Union, but it is incorrect to say that it would have been more offensive but for the restraining influence of England. Notoriously, it was not Lord Palmerston who restrained Napoleon III.; it was, as we have said, Alexander II. In another assertion Mr. Wells shows himself oddly incapable of taking the American point of view: "It should also not be forgotten" he says, "that after the war Great Britain submitted our claim of damages against her as a nation to arbitration, and paid without grumbling $15,000,000 in cash into the United States treasury, a sum which in the opinion of the arbitrators covered all the legitimate claims of the United States against her." As for grumbling, Mr. Wells must have sealed his ears with wax, if he has heard none from Englishmen over the Geneva award. We scarcely need point out, however, that the award was given to cover only such direct damages as could be brought home to particular privateers. The arbitrators were strictly forbidden to consider the question of indirect damages resulting from the annihilation of our enormous *ante-bellum* share of the ocean-carrying trade. A few years before the civil war, we transacted at least as much of the ocean-carrying trade of the world as did England; when the civil war closed, we had practically none. For that almost incalculable loss we have to blame, not solely indeed, but largely, the depredations of Confederate cruisers, which were built in England and equipped therefrom. It would be strange, had we already forgotten to what extent England is chargeable with the disappearance of our merchant navy which was once second to none upon the globe.

Mr. Wells acknowledges that the above enumerated causes of

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prejudice on the part of the people of the United States against England were powerfully operative in the past, but he thinks that they "ought not now to be, inasmuch as all the international differences involved have been amicably settled, undeniably to the advantage of the former, and are now only important as matters of history." We have shown that the international differences involved have not been settled to the advantage of the United States, and never will be, until British North America and the Bermudas are ceded to us, and until our ocean-carrying trade shall have recovered the proportions which it would have retained but for British connivance at the effort of Confederate privateers to drive our merchant vessels from the sea.

IV.

We pass to the consideration of a third cause of Anglophobia, which Mr. Wells terms "more potential than the aggregate influence of all other causes, and which is accepted and endorsed as in the nature of a rightful international grievance by nearly every member of our National or State legislatures, and by nearly every newspaper and magazine in the country." This third cause "is the assumption that the governmental and commercial policy of England is characterized by no other principle save to monopolize through arbitrary, selfish and unjust measures everything on the earth's surface that can glorify herself and promote the interests of her insular population, to the detriment of all other nations and peoples." Mr. Wells is mistaken in averring, that this third cause of American prejudice against England is far "more potential than the aggregate influence" of the causes previously named. We regret to say, but truth compels us to affirm, that, had we not repeatedly suffered at the hands of England wrongs which we are unable to forget, we might look with comparative indifference on the spoliative part which she has played in India, China, Burmah, South Africa and Egypt. Whether in the interests of humanity we ought to exhibit such indifference is another question. Mr. Wells devotes a number of pages to the attempt to prove that for the last half of a century, at all events, the period coincident with England's adhesion with a free-trade policy, her acts of aggression have been prompted by unselfish motives, and have had beneficial results for all parties concerned. He refers to the cul-

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tivation of the cinchona tree in India as one of the blessings due to the British occupation of that country; but he overlooks the cultivation of opium there, and the employment of a fleet and army to coerce China into a consumption of the noxious drug. He bids us admire the increase in the amount of wheat exported from India, which in 1880 was 500,000 bushels and is now 30,000,000 bushels. He omits to note that there has been so great a coincident decline in the quantity and quality of the cotton fabrics manufactured by the natives, that in order to save them from extinction, the Calcutta Government has been obliged to impose a duty on the cheaper but formerly inferior cotton goods sent from Manchester. It is only, however, a question of time when the ideal outcome of England's notion of free trade will have been reached in India, when, namely, almost all manufactured articles will be imported from Great Britain, and the whole labor of the enormous population from the Himalayas to Ceylon will be applied to the production of food staples and raw materials. That is not England's view of what constitutes civilization at home, but it is the kind of civilization which she would like to promote in her dependencies. Unquestionably, there is peace and there is order under British rule in India, but the British rulers are disliked, and the mass of the people would prefer to work out the problems of social existence in their own way. They have the same right to such a preference that all other peoples have. This may be said of the Egyptians also. It is true that the land tax is much lower in Egypt to-day than it was before the British occupation; that the interest on the public debt is promptly paid, and that the national securities in the hands of foreign bondholders are worth several times what was paid for them. Nevertheless, all intelligent Egyptians, while recognizing the value of the temporary service rendered by Great Britain, are of the opinion that the occupation should now end, and that opinion is shared by almost every civilized country except England. Mr. Wells is apparently unaware that England's refusal to evacuate the Nile delta is a glaring breach of faith, committed in defiance of explicit promises made by successive British Governments.

V.

We have seldom seen a more extraordinary perversion of recent history than is presented in Mr. Wells's account of Great

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Britain's relations with the Transvaal. What he calls a "striking and instructive exemplification" of England's beneficent treatment of weaker peoples is thus set forth: "Twenty years ago, when the safety of Europeans in South Africa was menaced by a general revolt of the dark-skinned races, England assumed the government of the Transvaal or South American republic; no other government coveting the expense or task of so doing. To provide for the common safety of the various people who, allured by the diamond fields and other inducements, were flocking into it, some rules of government became necessary. Accordingly, at a so-called Pretorian convention of South African representatives assembled in 1881, a code of rules or laws, drafted by the British Colonial Office in London, was adopted." One of these rules is then quoted by Mr. Wells, apparently for the purpose of conveying the impression that the alien residents of the Rand, who instigated Jameson's piratical expedition, have been deprived of rights to which they were legally entitled. The sentences in quotation marks are literally full of errors: it was not "twenty," but nineteen years ago, namely, in 1877, when the South African republic was not in the least endangered by a "revolt of the dark-skinned races" that England, we will not say "assumed," but flagrantly usurped, the government of the independent Transvaal Commonwealth. It is true that no other European nation coveted the task, for the reason that the burghers of the Transvaal were fully competent to govern themselves. As for emigrants being "allured by the diamond fields" in the Transvaal, the great deposits of diamonds are notoriously outside of the Hollander commonwealth. By "a so-called 'Pretorian' convention of South African representatives assembled in 1881," Mr. Wells apparently means the convention or treaty concluded in 1881 at Pretoria between Great Britain and the Transvaal State; but he neglects to mention that this convention was wholly superseded in 1884, whereby, although England secured the right to veto within six months a treaty made with any foreign power except the Orange Free State, the South African republic in all other particulars became entirely independent, and consequently qualified to make any laws for citizens or resident aliens that it might choose. How do the actual facts, as they are here narrated by us, constitute a striking and instructive exemplification of the benefits accruing from England's interference

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with weaker communities? The Convention of 1881 was wrung from England by the victory at Majuba Hill, and the subsequent treaty of 1884 was conceded simply because the Boers refused to tolerate the former arrangements any longer.

VI.

It is admitted by Mr. Wells that the accusations preferred against England's foreign policy on the score of greed had formerly some foundation. For then, he explains, England was protectionist, as all the countries on the continent of Europe, as well as the United States, are now. But now, he says, England is not chargeable with greed, for the reason that her commercial policy is framed upon the free trade principle. The wider her area of conquests now the better for us, because the larger will be the market to which we, as well as she, will gain access. Elsewhere in his article Mr. Wells has recognized that England allows her self-governing colonies, and, to some extent, British India, to impose protectionist tariffs in their own interests, the result of which fact is that American cotton goods are no more admitted duty free at Calcutta, at Halifax, or at Melbourne than they are at Hamburg or Bordeaux. But assuming that through British Guiana's absorption of the whole of Venezuela our commodities would be admitted duty free to that vast region, are we on that account to justify the extinction of a Latin-American nationality? Mr. Wells says frankly that what England wants is Barima Point, and that she wants it for the sake of procuring the free navigation of the Orinoco; and he holds that it would be for the benefit of the world to throw open that great river system, of which the Caracas Government now claims exclusive control. The argument obviously proves too much. If the Venezuelans are to have no voice in the disposal of their own possessions, and if Great Britain is to be sole arbiter of what the interests of civilization require, the compulsory opening of the Orinoco to free navigation to-day may be followed by a like usurpation with regard to the Amazon or La Plata river systems to-morrow. Nay, England would be justified in trying to deprive us of our present exclusive control of the Mississippi River system, for we, like the Venezuelans, are, as Mr. Wells contends, discredited and cursed by tariffs formed upon protectionist principles. In a word, if the remarkable opinions propounded

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by Mr. Wells last April in this REVIEW are pushed to their logical conclusions we should arrive at the assertion that a free trade country can do no wrong, while, on the other hand, protectionist countries have no rights that anybody need respect.

In the course of his article, Mr. Wells denies that the wrongs and abuses suffered by Ireland at the hands of England should have any influence on the feeling with which Great Britain is regarded by American citizens. It is out of the question that such wrongs and abuses should be entirely forgotten by that considerable element of the American population which is wholly or partly of Irish descent, or by those other elements which are brought into close and sympathetic contact with it. Sympathy for Ireland, indeed, had absolutely nothing to do with the fervent outburst of approval which greeted Mr. Cleveland's Venezuelan message. The voices of neither Irish Americans, German Americans nor Scandinavian Americans could be distinguished in the vehement response returned from all sections of the country.

A word more, and we have done. In one of his later paragraphs Mr. Wells acknowledges that England is hated by other nations. This hatred is attributed to fear, and the fear is in turn ascribed to the success of her commercial policy. On what ground, then, does he go on to say that the United States are hated in an equal degree? It cannot be for our commercial policy, because this is diametrically opposed to that of England. If then, both countries are hated, it is probably for some cause with which commercial policy has nothing whatever to do. As a matter of fact, we deny that "there is not a government on the American continent except Canada and Venezuela that does not both fear and hate us." The truth is that we are honored, esteemed and liked by every Latin-American republic with the possible exception of Chili; and even in Chili the Liberals are our friends, and if the Conservatives regard us sourly, it is only because we refused to favor their rebellion against President Balmaceda. Equally unjustified by evidence is the assertion that "all countries save England, and possibly Russia and Japan, would rejoice at the dissolution of the Federal Union." Now that France has become a republic, we know of no country in the Old World, with the exception of Spain, and possibly of England, that would wish to see the Union shattered.

M. W. HAZELTINE.

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WILD TRAITS IN TAME ANIMALS.

V.—DOMESTIC CATTLE.

BY DR. LOUIS ROBINSON.

THE study of domestic cattle should be of especial interest to us because they have undoubtedly occupied a more important place in our own ancestral history than any other species of animal. The Aryan tribesman from whom nearly all Western civilized folk are descended were cow-boys almost to a man. Like the Caffres and Damaras of South Africa to-day, all their thoughts were about their herds. This is shown in a curious way by the study of the early development of our language. The Sanskrit word for a king meant originally "a chief herdsman." The word for an assembly, or the meeting place of a congress, was the same as that for a cow-yard. A soldier was "one who fights about cows." It would seem as if they regarded nothing else as worth ruling over, or talking about, or fighting for. Prof. Max Müller traces the word "daughter" to the ancient term for a milkmaid. In the good old times they plainly did not take any account of young ladies who were not accomplished performers in the cow-pen.

The cow or the ox was for long ages the chief standard of value. Everything from a new coat to a new wife was priced at so many cows. Many of our words which refer to money bear traces of this, such as "fee" and "pecuniary," which are directly derived from the old English and Latin words for cattle. Doubtless, there were currency disputes when other materials began to be used for coinage, and difficulties arose about the adjustment of relative values. "Cow-metallism" might well have been an important plank in some of the Aryan political platforms.

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So numerous are the useful qualities of the tame *bovidæ* that it would be quite out of the question to discuss them in detail within the limits of a short article. I will, therefore, follow the plan I have adopted with regard to other animals, and trace to their primitive origin some of the characteristics of the species which we find most valuable.

Our common domestic cattle are descended from at least two wild varieties. One, the *Bos primigenius* or *Urus*, was a magnificent beast, as tall as a moose and with enormous horns. It probably inhabited the open, park-like country and swampy, sparsely-wooded plains. Its great width of horn would not have been suitable for life in the dense timber. The wild white cattle still kept in Chillingham Park in Northumberland are supposed to be its direct descendants. The other, the *Bos longifrons*, was much smaller and had short horns. Its habitat was probably among the grassy glades of the forest, where it browsed with the roebuck and the fallow deer. Some naturalists consider that another wild species, the *Bos frontosus*, was also an ancestor of the modern breeds, especially of the Norse cattle.

In early times the strength of the ox was much more generally made use of than at the present day. In some parts of England, as in the Southdown district, teams of black oxen, yoked two and two, are still used on the farms, especially for ploughing and rolling. In America the draught ox is being superseded by the quicker stepping horse in all parts; but the first ploughs which broke the virgin soil of the United States were drawn by the cattle which the early settlers took over with them.

For hauling lumber the ox has no equal. His patient temper and strength at a dead pull render him far better fitted for this class of work than the more hasty and irritable horse. In France and some other European countries he holds his own as a worker, and in the lazy East, where the heavy draught horse has never been made use of, he is still employed to scratch the soil or to tread out the corn.

In Sussex and in parts of New England the ancient form of yoke is still used, which fits on to the nape of the necks of two bullocks. In France and Germany the yoke is commonly fastened to the horns and brow, so that the beasts draw the load with their heads.

Certain humane people, both in England and America, have

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thought this primitive kind of harness barbarous and have designed collars and breast-straps for oxen. I shall show that this well-meant attempt at improvement was prompted by a misunderstanding of the history and habits of the beasts which these good folk thought to relieve.

Now, what were the natural circumstances of the wild cattle which gave rise to the strength which men have found so serviceable? Partly, like the speed and endurance of the horse, it may be attributed to the long struggle with carnivorous foes. The weakly or undersized cattle would naturally fall a prey more easily than those which were large and strong. But we shall find the chief cause in the fact that a desperate strife for the mastery was always going on between the rival bulls which desired to lord it over the rest of the herd. In these battles the strongest and most active would naturally come off victors. It was generally more a question of weight and strength than of agility, for bulls fight by charging and thrusting at one another with their horns. There is no doubt that the massive fore-end of the bull bison was developed by his habit of using himself as a projectile wherewith to batter his rivals out of the over-lordship of the herd. But the strategy of the common bull involves another method of attack. He tries to toss his opponent; and this feat, when he is dealing with a foe which weighs nearly a ton, requires considerable strength of neck.

Now it is this very strength that has been acquired for the purposes of war, which makes the ox so useful in peaceful agriculture. Men have not yet beaten their swords into ploughshares, but the ox has for many ages bowed the muscular neck by means of which he used to overthrow and gore his enemies, to the yoke which drags the plough. The strength of the neck even in the more feeble cattle is astonishing. I have known a slim and lady-like Jersey heifer hoist a cast-iron water cistern with her horns as easily as if it had been a tea cup. It would appear then that the French peasant's way of "hitching his critters" is right, and that the elaborate harness of the humane agriculturists is wrong.

The old-fashioned beam yoke, resting on the nape of the neck, is a kind of compromise. It is better than the breast straps, but not so good as the lighter yoke that fits the forehead and base of the horns. Nature has exactly adapted the

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structure of the head and neck of the ox for pushing; and since a pull is only a push with a string to it, depend upon it this is the most advantageous way for a team of oxen to draw a load.

When we take milk with our tea, or butter or cheese with our bread, we are conniving at what is, when looked at in one way, a particularly heartless form of theft. Did nature, in the first place, provide the milk for our benefit? Not at all: it is the provision for the poor innocent calf, and we have filched his property from him by force or trickery. But, passing over the moral aspect of the question—which you will generally find is the most discreet method when we are discussing our dealings with the lower animals—how is it that the cow is so especially useful in yielding us an abundant supply of milk?

The answer is: Because she is naturally a forest animal, that had often to leave her baby behind and to wander far for food. Wild cattle hide their young calves in the thickets. Unlike the colt, the calf has but feeble locomotive powers, and therefore it could not accompany the cow when she travelled to distant glades, where grass was abundant. Thus the sucking calf cannot get his nutriment whenever he wants it, as the young foal can, which is never away from the mare. He has to wait for his meals until his mother returns. But this arrangement also renders it needful that the cow's udder should hold a good store of milk, which slowly collects during the hours when she is absent from her baby. Hence the large "bag," which always distinguishes a good milker, and hence, also, the important fact that a cow retains her milk until the morning and evening visits of the farmer or dairymaid.

The habit of chewing the cud among cattle and other herbivorous animals tells a similar tale. They had no time to masticate the grass thoroughly when they were feeding, but were obliged to get in a supply of provisions as rapidly as possible, and during the hours when the wild beasts were least abroad. Having got in their store, they retired to their safe hiding places and lay down to ruminate at leisure.

It is easy to see that cattle are at home in a moist and wooded country. The feral cattle of Texas and Australia never from choice stray far from the woods. Out on the Western ranches there are, of course, few trees, and the beasts thrive fairly well; but, for all that, the conditions of their life are artificial and are

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not such as they would select if free to choose their own dwelling-place. All cattle love to stand knee-deep in water and under the shadow of trees. Their heads are carried low, even when they are startled, so that they can see under the spreading branches of the forest. Compare the habitual position of the head of a cow with that of the heads of the horse, pronghorn, or guanaco, which live in the open and have to watch the horizon for the approach of enemies.

Then the split hoofs of the cattle are wonderfully adapted for progress over soft ground. In galloping through bogs or deep mud an ox or a buffalo will easily distance a swift horse. Their toes spread wide and so they do not sink in so far as the solid-hoofed animal. What is even more important, the open cleft between the toes allows the air to enter the hole in the mud as the foot is withdrawn; whereas, a horse's hoof sticks like a "sucker," owing to the partial vacuum below it, and can only be dragged out by a great muscular effort. Mounted hunters have been overtaken and killed by buffaloes—African and Indian—owing to this fact.

How are we to explain the fact that farmers find it necessary to make away with bulls when they are four or five years old, because they then become so pugnacious and unmanageable? I learned from the keepers at Chillingham that each mob of wild cattle is under the command of a single powerful bull, and he keeps all the others in absolute subjection. When a stronger than he arises, and indeed whenever a younger one comes to maturity, there is a terrific battle, and if the original lord of the harem is worsted he retires into sour solitude. The cows and all the young bulls are obedient to the chief, and this habit of submission is taken advantage of by the stockman, who, among domestic cattle, may be regarded as the deposed King Bull's deputy. But when the young bulls get their full growth and strength, their wild instinct impels them to commence a determined tussle for the mastery.

In the freedom of the forest this was laudable ambition, and might lead to the chieftainship of the herd; but in the farmyard it is regarded as viciousness; so the human "boss," whose supremacy is thus disputed, settles the controversy in a summary way, and sends for the butcher.

LOUIS ROBINSON.

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THE MICROSCOPICAL STUDY OF LIVING MATTER.

BY CHARLES SEDGWICK MINOT.

I.—METHODS.

SCIENTIFIC apparatus are, broadly defined, of two classes—quantitative and qualitative; or, in other words, they are either instruments to increase the accuracy of the work of scientific observation, or else to increase the range, or the number of possible kinds, of observations. In each class there is one apparatus which rightfully holds the first place, *facile princeps* —among instruments of precision, the balance; among instruments extending the possibilities of observation, the microscope. Yet it must be at once added that it is only since the microscope has had the co-operating advantage of the microtome that its full value has been developed. The microtome is in certain respects the most perfect instrument of precision we possess, and works with greater exactitude than most fine apparatus of the physicist. Before proceeding to the special subject of this article, a few words in regard to both the microscope and the microtome are necessary.

The microscope has been very slowly evolved and is the creation of no one man. In its present form it is, like a living species according to Darwin, the outcome of the survival of the fittest of innumerable variations, the majority of which have been discarded. Indeed to one interested in microscopes and familiar with the present model, nothing can seem quainter than the old forms, which prevailed during the earlier half of this century and have since become extinct. In the evolution of the microscope two factors have been dominant, the demand for optical improvement and the demand for mechanical convenience. Both of these demands have been well met, so that there

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appears little left for the future to achieve, until an entirely new direction is opened for further evolution. It need hardly be premised that the optical part is the essential part of a microscope. The optical performance of the best microscopes is to-day nearly perfect, having become so very slowly by numerous small improvements. Although magnifying glasses were invented, it is said, in the twelfth century, compound microscopes with achromatic lenses have been in use barely three-quarters of a century, while the introduction of homogeneous immersion lenses dates from 1878, and of the perfected apochromatic lenses from 1886.

The history of the microtome is much briefer, only about twenty-five years. About 1865 the habit of making thin slices of plants and of certain parts of animals for microscopical examination was becoming general, for it was found to be very advantageous for the study of the minute elementary constituents of organs. By means of sections taken in various planes it was found possible to gain a profound insight into the intimate structure of parts far too small and delicate for ordinary dissection of them to be possible. Another discovery increased the scientific importance of microscopical sections. The microscopically visible elements of living bodies are found to include a variety of constituents, which in their natural condition can be identified only with difficulty, or not at all. The discovery referred to was that some of these constituents can be artificially colored so that they become conspicuous when magnified; it was accidentally made in 1858 by Professor Gerlach, who used carmine to prepare a colored injection of blood vessels. Since then very numerous coloring agents have been employed and the methods of applying them to sections to bring out this or that fine detail of organization have been enormously developed. Thus it has come about that our present conceptions of the structure and functions of living matter are so largely based on the knowledge derived from the study of sections artificially stained, that without the art of preparing them half of the progress made by biology during the last quarter century would certainly have been impossible. From this standpoint it is easy to understand the importance, to investigators and students of biological sciences, of the section-cutting machine or microtome.

The first microtomes were invented by Frenchmen, one form

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by the botanist Gabriel Rivet,* the other by the anatomist, Léon Ranvier, in whose laboratory at the *Collége de France* in Paris I had the advantage of working shortly after his microtome was first introduced (1872). A very simple affair it was, nevertheless at that time a great boon. Until then when a section for the microscope was needed, the object to be cut was held in one hand and a sharp razor in the other—we did not know then that a razor is a very poor tool for delicate cutting—and one cut as thin a slice as one's skill permitted. To make any section at all required great natural dexterity and much practice; and to make a tolerable section was the privilege of only the exceptionally skilful; to make what would now be considered a good section was altogether impossible. The idea which Rivet and Ranvier applied was that of mechanical movement, on the one hand for the knife, on the other for raising the object so as to regulate the thickness of the sections. Their microtomes gave us sections of even and known thickness, their best performance being at the rate of from thirty to forty sections per millimetre. It is true that microtomes had been made earlier by Oschatz and Welcker and perhaps others, but nothing available resulted. The instruments were failures, and the credit for the invention is properly divided between Rivet and Ranvier.

During the next few years a rapid succession of minor improvements in microtome construction was effected, by which the possibility was achieved of securing sections about one-half as thick as before. It then became clear that the principal difficulty lay with the tissues of plants and animals, and that any further advance in the art of preparing very thin sections must depend upon so treating the living material that it would be better suited for slicing. After innumerable trials of methods the most diverse, we have learned by experience to look upon paraffine as our chief resource. It is superfluous to enter upon details of technique, but by a series of delicate manipulations it is possible to permeate a vegetable or animal organ with paraffine, so that it becomes absolutely uniform in consistency, especially as regards elasticity and hardness, and may therefore be readily cut into much thinner sections than otherwise, so that at present it is an easy matter to make sections at the rate of 150 to 200 per millimetre. This again puts greater requirements upon the

* First announced in "*Bulletin Soc. Botanique de France*," Vol. XV., p. 31 1868).

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microtome. Experience has here been instructive. When a section is made which is only one-two-hundredth of a millimetre thick, its perfection depends upon its having two parallel surfaces, both cut by the knife. If the surfaces are not parallel the sections will not be good, in other words the error of the cutting motion must be only a fraction of the diameter of the section, which means that the accuracy of the microtome must be far beyond the utmost visible precision. To attain this result two important rules have been learned. *First,* that the microtome must be built very heavy and entirely of metal; the finer the sections it is expected to make, the more solid and rigid must the construction be. *Second,* the knife must be made not thin-bladed, like a razor, but very thick and more like a chisel. The best knives are now about three-eighths of an inch thick at the back and their cross-section is wedge-shaped. The object of these rules is to eliminate the error due to the elasticity of the metals, for a bending of a metallic part of a microtome far too minute to be seen by the naked eye would suffice to ruin the quality of a section. I have been testing a new microtome, invented and manufactured in this country, in which especial attention has been given to securing the utmost delicacy of action, and it now seems probable that with this machine a successfully prepared specimen can be cut into perfect sections of one five-hundreth of a millimetre, which is at the rate of nearly 13,000 to an inch. Indeed, I hope sections of one-thousandth of a millimetre will be readily made. The special value of such sections to the biologist is owing to the size of the microscopic elements of animals and plants. These elements are named *cells;* each cell consists of a central mass or *nucleus,* which is completely enveloped in a peculiar substance, known as protoplasm. In the human body the diameter of a single cell averages perhaps fourteen-thousandths of a millimetre (0.014 mm.) and the diameter of a nucleus perhaps six-thousandths of a millimetre (0.006 mm.). It is not until our sections made with a microtome are less than one-two-hundredth of a millimetre that they are sufficiently thin to take in not more than a single nucleus. These thin sections are therefore indispensable for the study of nuclei, and from the study of nuclei, many of the most remarkable and fundamental conclusions of modern biology are derived, such, for example, as our current theory of heredity.

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Some conception of the minute dimensions within which the biologist actually carries on his manipulations may be gathered from the fact that, whereas he makes sections of two thousandths of a millimetre and which probably do not vary one five-thousandth in thickness, the astronomer, as I learn through the Director of the Harvard Observatory—Professor Pickering—does not carry his finest accurate measurements beyond about the same value:—0.002 mm.*

The progress of biology depends to a greater extent than the progress of any other branch of science upon the application of the microscrope. The increase in the efficiency of the microscope as an instrument of research during the past dozen years has been great and is due to the improvement of the optical quality of the lenses, and is due still more to improvements: *First*, in the art of section cutting, and, *second*, in the art of artificially coloring sections, so as to render clearly visible details of microscopical structure, which cannot be otherwise definitely recognized. Every microscopist anticipates immediate progress because the use of coloring matters for his work is in its infancy only and the possibilities of the near future in this regard have aroused the keenest hopes.

II.—THE THEORY OF LIFE-UNITS.

THE existence of cells in plants was demonstrated by Schleiden in 1838, their existence in animals by Schwann in 1839. Cells have been termed by the Viennese physiologist, Ernst Brücke, "elementary organisms" and this appellation still indicates the prevalent conception of biologists to-day. But there has been a growing reaction, which has found its culminating expression in Professor Whitman's utterances on the "inadequacy of the cell-doctrine." This new view seeks for material units much smaller than a single cell, units which carry on vital functions very much as molecules carry on chemical functions. I propose to designate this view as the "Theory of life-units." The theory is protean, but despite its forms and modifications

*Professor Pickering writes me that Nobert's nineteenth band has been resolved and is ruled on glass at the rate of about 4,436 lines to a millimetre. He adds: "A graduate circle 1 m. in diameter (such as are in common use for meridian circles) allows $\frac{1{,}000\ \pi}{1{,}296{,}000}$ mm. to every second of arc; that is 0.0024 mm. The readings are usually made to tenths of seconds, and the graduation should be correct to within a few tenths of a second. The successive lines of the graduation are usually 5′ apart.

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its invariable foundation is the hypothesis that the living matter (protoplasm and nucleus) includes, *first*, a non-living portion, and, *second*, a number of discrete particles which are very much smaller than cells and carry on some or all of the distinctively vital functions, especially hereditary transmission and the production of organization. The authorities are agreed as to the existence of such particles for which I have adopted the name of "Life-units," but they are nowise agreed as to the exact size, number or functions of life-units, upon which many different names have been bestowed, whereof more later. As to size the particles are held to be somewhere near the limits of microscopic vision, that is either too small to be seen, or else identical with certain visible granules of minute dimensions.

The theories of life-units were foreshadowed in the last century by Buffon and Bonnet, and in this century by Richard Owen, in his article on Parthenogenesis, published in 1849, but it was reserved for that Englishman, who stands next to Shakespeare in world-wide fame, to create the first scientifically available form of the theory with which we are here concerned. Darwin called his view the "Theory of Pangenesis," and named the life-units "*gemmules*." Their existence was purely hypothetical with him, and he made no attempt to determine their size. *Gemmules* are thrown off from every part of the body and circulate freely through the system; they are transmitted from parent to offspring; in their dormant state they have a mutual affinity for each other, leading to their aggregation either into buds or into sexual elements; when supplied by proper nutriment they multiply by self-division, subsequently becoming developed into cells like those from which they were derived. Such in brief was Darwin's theory, stated almost in his own phrases. Although we now know definitely that the theory is untenable, I can repeat what I have said elsewhere:* "This hypothesis is the suggestion of a masterly mind, and as a succinct and comprehensive expression of the facts of heredity must command admiration."

The second of the theories of life-units was formulated by Herbert Spencer in his *Principles of Biology*, 1864. It was an original and valuable hypothesis and a distinct advance beyond the theory of Pangenesis. Spencer's arguments may be found in the fourth and eighth chapters of Part II., of his *Biology*. He

**Human Embryology*, p. 86. (New York, 1892.)

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terms his hypothetical particles "*physiological units*," fixes their size as larger than chemical units, and smaller than cells, and assigns to them especially what would now be called the morphogenetic function or production of organization, in other words he attributes to their activities the phenomena of repair, regeneration of lost parts, and of reproduction (hereditary transmission). Spencer's theory is historically so important that I will quote a few lines. "If then, this organic polarity can be possessed neither by the chemical units nor the morphological units, we must conceive it as possessed by certain intermediate units, which we may term physiological. . . . We shall hereafter find various reasons for inferring that such physiological units exist, and that to their specific properties, more or less unlike in each plant and animal, various organic phenomena are due."

There have been several modifications of the theory of pangenesis. One of the first illustrates the grotesque vagaries of ignorance, and may interest the psychologically curious, though scientifically it is worthless. It was entitled the "perigenesis of the plastidules" and was produced by Ernst Hæckel, a sensational popular writer, whose statements have been found to be usually erroneous. *Plastidules* were life-units, and the same term has been used by the late Dr. Elsberg of New York. The botanist Nägeli, in 1884, uses the term *idioplasmatheilchen*, de Vries, in 1889, the term *pangenes*, Wiesner *plassomes*, Whitman, in 1893, *idiosomes*, Haacke *gemmaria*. August Weismann has a much more complete scheme; his life-units are *biophores*, which in groups form *determinants*, groups of which form *ids*, groups of which form *idants*. Each one of these authors has his special set of opinions regarding the sizes, shapes, relations, qualities and functions of his particular kind of life-unit. Together they have made a gay tournament of hypotheses.

In all the theories above alluded to the life-units are purely hypothetical; but there is another set in which the life-units are identified as certain visible minute granules found in cells. The first to propound a theory of visible life-units was Lionel Beale, who maintained that all organisms consist of formative material, which was living, and of formed material, or dead matter. The visible grains of formative matter were his life-

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units and were designated by him with the name *biolasts*. Essentially similar are the theories of *granuli* (Bioblasten) of the German Altmann and his Italian follower, Zoja. Again, under the influence of the prevailing tendency, various writers have found the agents of hereditary transmission in certain granules in the nucleus, which are thus made into life-units with restricted functions. These granules are termed chromosomes, on account of their special affinity for coloring matters of various kinds, but by the theorizers are variously christened.

The theory of life units, whatever its precise form, is closely connected with the conception of definite structure in living matter. Now structure, as biologists currently conceive it, implies the presence of at least a framework of solid material. When we examine living matter it is usually after it has been subjected to various re-agents and profoundly altered. Studying protoplasm in this way, investigators have been led to consider it to be made up of a network of true protoplasm, the meshes of which are filled with fluid. Since the fluid is merely water with certain substances in solution, it cannot be alive, but life resides properly in the threads of protoplasm, which contain accordingly the hypothetical life-units.

III.—THE THEORY OF THE LIVING FLUID.

THIS theory is new, though hints and suggestions of it are not lacking in older publications. It may be briefly formulated thus: *The physical basis of life is protoplasm; protoplasm consists of two fluids, intimately commingled, yet separate, and which may include various granules of solid organic substances, more or less complex, and also include globules of various liquids.* This theory in its best form has been termed the foam theory, because foam offers the most familiar illustration of the kind of structure conceived by this theory as characteristic of living matter. As in foam, air and water are commingled, so in protoplasm are cell-sap and the proteid or albumenoid fluid commingled. The latter it is, which, when coagulated by our so-called preserving re-agents, gives under the microscope the familiar appearance of a network of solid threads. This theory I consider by far the best theory of the nature of protoplasm yet advanced. Professor Otto Bütschli of Heidelberg has been the leading advocate of the theory. I will mention only two of the kinds of phenomena,

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which the foam theory accounts for better than any other. The first is the fusing of two masses of protoplasm, so that they are absolutely confluent. The second is the incessant chemical change, which would be, there are reasons for thinking, more perfectly favored by the foam structure than by any other disposition of the multifarious materials collected in protoplasm.

The point which interests us in the present connection is that the acceptance of the *Theory of the Living Fluid* involves the rejection of all the theories of life-units. The former requires us to conceive that the phenomena of life are due to the interaction of numerous substances, many of which are present in sufficient bulk to be visible under the microscope. Hence the smallest volume in which vital phenomena can show themselves must be larger than the particles which have been assumed to be life-units. It has been shown experimentally that there is a limit to the mechanical division of living matter. It seems to me that we have now reached a point when we need no longer divide protoplasm into its living and not living constituents. It is all living, the water and salts as much as the proteids and other organic compounds. Its phenomena are displays of energy resulting, so far as we at present know, from chemical actions, the possibility of which is given by the commingling of substances in the foam-structure.

The perfected machinery and methods which we discussed in the first part promise to give us a vastly more profound insight into the minute composition of protoplasm. It is a problem of composition, not of structure, as ordinarily understood, nor of life-units, which protoplasm presents to us.

The conception of protoplasm above advocated seems at first to involve a complete materialism, but against this conclusion I must protest, for I hold that an opposite interpretation of life best accords with our knowledge—namely, that since there appear to be vital phenomena, which do not occur without life, it is legitimate to assume that there is a special vital power, which is not necessarily identical with any form of physical energy, though it may be conceived to cause the transformation of energy. Indeed, it is perfectly thinkable that the universe would come to rest, were not the balance of the forms of energy disturbed by the life-power.

CHARLES SEDGWICK MINOT.

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THE FUTURE LIFE AND THE CONDITION OF MAN THEREIN.—V.

BY THE RIGHT HON. W. E. GLADSTONE.

II.—MAN'S CONDITION IN THE FUTURE LIFE.

Limitation and Reserve of Scripture and the Creeds.

LET us now consider what are the propositions relating to the future life, which have from the first been included in the summaries of our faith, and which, upon the historical principles of the church at large, are regarded as binding upon all Christians.

If we ask, What are the propositions associated with this subject which ought to be considered as belonging to the essence of the Christian faith and as obligatory upon our personal belief? the sacred Scriptures do not appear to supply a ready answer to this question. But history assures us at how early a date, how long certainly before the epoch of any Council except that held at Jerusalem under the Apostles, the Church, or the general sense of the body of Christian believers, began to build upon the foundation and to follow the example supplied with divine authority by the Baptismal Formula, and to incorporate in various forms the substance of the one brief document which soon, replacing at least one even older form employed in Rome, became supreme throughout the entire West under the name of the Apostles' Creed. In this creed we declare our belief in "the resurrection of the body, and the life everlasting." So far we are clearly dealing with matter of obligatory belief.

The creed elaborated at Nice and Constantinople represents, even more than any other document, the prolonged, concentrated, and most severely tested action of the mind of the universal church. In the last of these particulars it stands alone. It was through the agonies of the fourth century, the hardest of all the

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trials, the noblest of all the victories, of the Church of God, that this creed made its way to a position unrivalled alike in loftiness and in solidity. In the East it may be said to enjoy an exclusive dominance. In the West, through the Eucharistic office, it holds the grandest of all positions in Christian worship, so that it is, equally with the Apostles' Creed, incessantly presented to the mind of the Church. It is not necessary now to speak of the several additions made to it under Latin authority in much later times. In this consummate document, mainly as received from Nice and Constantinople, we declare that we "look for," and of course therefore believe in, "the resurrection of the dead, and the life of the world to come."

The Athanasian creed, apart from its anathemas, is a great and wonderful product of substantive theology concerning the Trinity and even more the Incarnation of our Lord; but it is not, I believe, placed, except in the Anglican Articles of Religion, which do not form a Confession for the Church of England at large, on a level with the two preceding creeds; nor is it, except within the English Church, presented with the same familiarity, by inclusion in the public services, to the general mind of believers. It declares that men shall rise again with their bodies; shall render an account for their works; and shall if they have done good "go into life everlasting"; if they have done evil "into everlasting fire." The main distinctions offered by this creed are not that it penetrates further, as modern opinion has done, into the nature of eternity and the particulars of the Divine counsels, but that it presents to us expressly what I suppose cannot be excluded from the implications of the other creeds, namely the survival and passage into eternity of the wicked as well as of the righteous. But seeing that the rank given to this creed is only (so to speak) sectional, I shall not rely upon it in the examination with which we are immediately concerned. On the one hand, it repeats words which were solemnly delivered by our Savior. But as those words are subject to some variety of interpretation, while they have a tendency to widen the demands on faith which sufficed for the earlier creeds, we may reflect with satisfaction that this creed does not carry in the general mind of the Church an equivalent authority. There is another particular of extension which may even be thought accidental. For the Athanasian Creed extends its propositions to the whole race of men, while the older and

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more authoritative documents are content to deal, at least by reasonable implication, only with professing Christians.

Concentrating, then, our attention upon the declarations contained in the other two creeds, and bearing in mind the immeasurable importance of the future state under the Christian dispensation, we cannot but be struck alike with their simplicity and their reserve. Out of four propositions, three, asserting the resurrection, the life everlasting, and the life of the world to come, may be said most rigidly to confine themselves within the limits of elementary Scripture, and to resolve themselves into one, namely, that we who recite the creed are to pass at death into eternity. And here we find that the idea vividly presented to us is the survival of the righteous, whose condition is so properly conveyed under the word "life." I do not presume to say that the case of the wicked is excluded. It seems to remain, however, as it were, in the shade. There is here neither declaration nor implication as to the meaning of eternity, as to the relative numbers of those on the right hand or the left, or as to the conditions of the doom which awaits the sinner.

And surely it is delightful to contemplate the providential wisdom which guided the mind of the early and undivided Church to establish and enforce for us all the doctrine of a future life, but saved it from the unnecessary and entangling speculations, into which more recent opinion seems for a long period to have been betrayed.

But it may be asked: Why, if a temper of reserve so largely prevailed, did the Creed of the Apostles declare in express terms the Resurrection of the Body? It is not difficult to suggest the probable reason. Those schools of ancient philosophy, which had labored honestly and well by ingenious speculations to save us from the apprehension of extinction at death had founded themselves largely on metaphysical arguments associated with the nature of the soul, and had been unable to retain any grasp of the idea of a future corporeal existence. From the time of Homer great difficulty seems to have been felt in regard to the relation between the several parts of man. Homer was influenced by Egyptian ideas. But the conception of the future life became less and less strong among the Greek race who supplied the great masters of philosophy: and, whether with or without any definite conception of existence purely immaterial, they lost as I suppose the

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idea of any bodily survival. If, when Christians were few, and the new institutions in their infancy, this was the established tone of thought, we may well conceive that, for a practical fulfillment of the great promise to bring life and immortality to light, it was needful that there should be an express provision, familiar to all Christians, for securing a complete and not a merely partial conception of the great human survival.

While, then, the sum of authoritative declarations on the future state, by the full action and consent of the Church, is thus carefully limited in the creeds, I am aware of no other bond which should restrain us from canvassing with greater freedom the assumptions which I have recently enumerated, provided we do not forget the reverence and caution which encircle the subject. It is, indeed, necessary for us to be on our guard against the silent and unwatched intrusion into the religious precinct of conceptions which nowhere bear the sacred stamp, but belong, whether their value be great or small, to the ordinary circle of secular knowledge or opinion. And such we must surely admit to be the popular conception of time. Be it ever so true that, for us, in our present condition, the idea of time may fairly be regarded as a simple idea, incapable of resolution into parts, it does not therefore follow that we are entitled to pronounce on its always continuing such in other and, perhaps, quite differently ordered states of existence.

I confess myself at a loss to see on what just ground there can be constructed any claim upon the ordinary Christian to concern himself with more than the propositions of the creeds as portions of his necessary faith. It would seem that if he entertain other propositions he is under no obligation to elevate them to so high a plane.

Of the limited service which it is my hope and aim to render, by the present examination, to the combined cause of truth and charity, a principal part will consist in my endeavors to remove from the field of controversy a variety of assumptions which, as it appears to me, have no title to a place there, and which have tended both to widen the issue raised and to perplex and embitter the dispute.

1. It is assumed that the Christian Revelation is designed to convey to us the intentions of the Almighty as to the condition, in the world to come, not of Christians only, but of all mankind.

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2. It is assumed that when the Scriptures speak of things eternal, they convey to us that eternity is a prolongation without measure of what we know as time.

3. It is assumed that punishment is a thing inflicted from without, *flagellum Tisiphone quatit insultans*, and is something additional to or distinct from the pain or dissatisfaction which, under the law of nature, stands as the appropriate and inborn consequence of misdoing.

4. It is assumed that the traditional theory propounds, and the teaching of Scripture requires us to believe that, of those who are to be judged as Christians, only a small minority can be saved.

5. It is assumed under the doctrine of natural immortality that every human being has by Divine decree a field of existence commensurate with that of Deity itself.

In all these assumptions there is expressly or tacitly included a claim to be received as portions of the Divine revelation to man.

I shall hazard some remarks upon them one by one.

And first, as to the supposition that the Christian scheme deals with the future destinies of all mankind.

The New Testament has many references to a future and what seems to be a final judgment, but with one exception they are marked by paucity of detail. Where argument is introduced, and it is found only in one case, the unprofitable servant is manifestly a typical person representative of those with whom the Lord of all has already had open dealings, and who have been placed in a condition to know with whom it is that they have to do, and how they ought to proceed in regard to the trust committed to them; for they were aware that he was a hard man, who would rigidly exact account; also it is plain that they began their work on a footing of equality with the "good and faithful servants."*

The single instance in the gospels which penetrates further than this into the case, and exhibits the specific reasons of the future doom, is the majestic recital which immediately follows the parable of the talents.† In this profoundly impressive passage, but one description of virtuous action and of its opposite is recorded, that, namely, which includes what are termed the cor-

*Matt. xviii., 24; xxv., 14.
†Matt. xxv., 31-46.

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poral works of mercy. It may be hazardous to do even so much as glance at the reasons which induced our Lord in his wisdom at once to expatiate as he has here done, and also to set bounds to His exposition. Can it have been that He foresaw that the most conspicuous point of failure among nominal believers would be in the law of mutual love, and in discerning the connection between that law and personal love to Christ, who addresses us in the person of the distressed? Be this as it may, we observe that both the righteous, who disclaim all merit, and the unrighteous, who are unaware of their ill desert, are alike addressed as persons emerging from a temporal dispensation, under which good offices toward man are directly associated with duty to God. This is a conception which not only is markedly Christian, but which had so faded away from, or which lay so little within, heathen knowledge, that it could hardly in their case have formed the basis of an equitable judgment.

What is still more to the purpose than this noteworthy representation, is the fact that St. Paul* has somewhat elaborately expounded the separate case of those who remain under the law of natural righteousness. In the day when God shall judge the hidden things of mankind according to the gospel revelation, he will also judge the portion of mankind outside the special covenant, according to law of nature written in their hearts and according as they have obeyed or disobeyed that law. Let us, therefore, wholly disembarrass ourselves from the idea that those who have not been supplied with the means of Christian combat will be judged according to the standard of the Christian law.

Secondly; it is assumed that eternity is a prolongation of time continued without any limit. I ask myself in vain whether there is any governing exposition supplied to us by the Scriptures or the creeds, or the authentic tradition of Christendom, which entitles us to make this assumption. Without denying that it has been much in vogue, and that when indeterminate questions are determined there is a seeming accession to our knowledge which we are readily tempted to accept, I presume to express some hesitation as to both its foundation and its utility. To say that we cannot separate the idea of duration from our common conceptions of future life is saying nothing to the purpose. This may be a subject for metaphysical speculation: it is not part of

* Rom I., 18.; II., 16.

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the truths declared to us for our guidance. The Scripture goes but a little way on this subject; but, so far as it goes, it does not seem greatly to favor the idea now before us. When it tells us that with God a thousand years are but as one day, it seems as if these words might mean that the being of the Deity is outside the conditions of time, and that this meaning is not only allowable, but may fairly compete with others which can attach to them. And if the grand idea of the future reserved for righteous souls be, according to the gospel, a re-establishment in the original charter of our nature by reunion with God, and if God have an existence outside of time, who can tell whether or not an independence of time may not be included in the conditions of this reunion?

Look for a moment at eternity under the view of its being an immeasurable expansion of time. Consider for a moment the very large meaning involved in this proposition. The contemplation even of our own narrow span of life as a whole, when seriously attempted, seems to fill the mind nearly up to the limit of its receptive power. A million is a numerical accumulation which, if regarded at once as a whole and in its units, seriously baffles us. But now we are called to heap together millions, billions and quadrillions without limit, and to recollect that in doing it we do nothing: and however often we repeat the process, it is the same *toties quoties:* the score is undiminished. In dealing with such a conception we pass beyond our depth. If all this may be so, yet it seems hard to compel every mind into the belief that it must be so; and there is something to be said here also in favor of taking refuge in our ignorance.

This much we may presume to say. Had the Divine revelation been intended to convey to us that time is an inseparable incident of the future life, and that eternity is no more or less than the unfolding of an immeasurable roll of time, it seems probable that the Bible could and would have employed some terminology evidently adapted to that purpose. But such is not the terminology actually given us. For, in dealing with the condition of the righteous in the world to come, our Savior builds not upon terms of time, but upon re-union with Deity. And in touching with greater reserve upon the condition of the wicked the image presented to us is either simply negative, as in the case

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of the five virgins, or it is one of suffering without reference to duration, as in the outer darkness where there will be weeping and gnashing of teeth; or, it is associated with words which etymologically and by use signify the indefinite rather than the infinite. Some of the passages without doubt introduce the awful image of finality. But such presentations are held by some to be of extinction and total disappearance, rather than of a miserable existence co-extensive with that of Deity, and they may be possibly susceptible of other explanations at present hidden from our view. In any case this great diversity of delineation may be thought to indicate a purpose of reserve.

On the third assumption it will not be necessary to dwell at great length. But there is a great difference between two separate methods of administering justice. This man, let us suppose, has committed manslaughter: let him, according to the circumstances, be imprisoned for one year, or for ten, or for life. This forensic or purely extraneous method, only with a more exact and less coarse adaptation, is the favorite notion under which the opponents of eternal punishment are prone to exhibit it. It is very different from those punishments, which, in the language of Butler, arrive by way of natural consequence. For, as to these, nature herself is our premonitory teacher. And her lessons cannot be shut out, except by the method, at once stupid and audacious, of refusing to think. The drunkard, for example, knows that by the repetition of inebriety he is losing his freedom. And, if he knows this in the later stages of his downward course but faintly and dimly, whereas he had known it at the beginning well and clearly, the meaning is, that his punishment "in the way of natural consequence" has begun; that its initial stage is a warning mercifully sent, like the first loss at a gambling table, in order that he may be induced to avoid those which are to follow; and that, if the warning be neglected, he shall proceed from bad to worse. As it is on this basis that the teachers of the more rigid doctrine, profiting perhaps by the lessons of experience, commonly build their system, it is on this basis that they ought to be met by their opponents.

Fourthly; it is assumed that we are required by the language of Holy Scripture to limit the salvation of professing Christians to a very small minority of their total number.

Fairness constrains me to admit that this has commonly or often been presented as an item of the ordinary teaching on the

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subject of future punishment. My desire is to offer some considerations which tend so far at least to throw doubt upon the assumption as to make it expedient and rational to hold this part also of the subject in reserve.

When our Lord delivered in Galilee the Sermon on the Mount, He admonished His audience that the gate of salvation was strait, and the way narrow and found by few; while the gate and way of destruction were broad and easy, and found by many.* And all the words of our Blessed Lord are perfect in truth and wisdom. Yet is our duty to compare them together, and so far as may be to collect their effect as a whole. It seems indisputable that they do not invariably (as, for example, in the parable of the unjust steward) present to us, at each and every point, each and every aspect of the case in hand; and possibly this is a result inherent in the conditions of human language. The Gospel of St. Matthew, it is largely agreed, was composed with a special reference to the condition and exigencies of the Jewish race; that of St. Luke with a wider outlook upon the Gentiles also. In those chapters of St. Luke, which offer many remarkable correspondences with the Sermon on the Mount, the image of the strait gate reappears in connection with the difficulty of entering it, and they become the basis of an exhortation not to seek merely, but to strive, that is to seek manfully and with might, to enter it; while the passage is immediately followed by an impressive contrast between the case of Jews rejected in the great account, and that of Gentiles then admitted,† which may possibly indicate something of specialty or local color in what may be called the sister passage. It is also noteworthy that the words of our Lord are a reply to the inquiry: "Lord, are there few that be saved?" In declining a reply to this question, must we not admit that he seems to close the door upon the subject and thereby to mark it as one of unprofitable speculation?

In any case, we are bound to have regard to the general effect of our Lord's teaching; and in this case the more so, because he so frequently deals, not with occasion and current life, but, *ex professo*, with the final upshot of human destinies. In all his teachings, by parable or otherwise, we look in vain for any revelation of the relative numbers of the accepted and the lost. It

*Matt. vii., 13, 14.
†Luke xiii., 23-30.

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is not in the sheep and the goats. It is not in the tares and the wheat. In the case of the wise and the foolish virgins, where the *pœna damni* alone seems to be awarded, the numbers are equal. In the case of the talents, two of the entrusted servants are mentioned for acceptance, one only for rejection. In the case of the gathering from highways and hedges to replace those who had refused the invitation to the banquet, there is no specification of numbers or proportions. In the case of the guest chamber, the wedding feast is eaten by a number of persons, but only one is detected as not having on the wedding garment.

It is, I presume, our duty to consider with humble care and without prepossession the general effect of these very varied indications in the discourses of our Saviour. For this the foregoing remarks are intended. The conclusion towards which they seem to point is that, as in sundry other matters, so with regard to the comparative numbers of professing Christians saved and lost, Divine Wisdom has, doubtless for the best reason, veiled its counsels with stringent limitation and reserve.

Lastly, the inclusion in religious teaching of a supposed law of natural immortality has been so largely discussed in prior portions of these papers, and especially in considering the history of Christian opinion, that any return to the subject in this place would be superfluous, except it be as to a point properly collateral.

It is admitted that the resurrection of the body as such is an exclusively Christian doctrine; true as it may be that the conception of a future life in the last resort involved an approach at least to corporeal elements, such as figures of some kind. But, according to Christian doctrine (I. Cor., xv., 36–44) the natural or mortal body has in it a seed from which shall spring the spiritual or immortal body; let us consider how much this implies. The body is now the instrument and servant of the soul, while it reciprocally exercises powerful influences upon it. But this body is not a mere appendage or vestment to the man: it is a part of him. Thus far it seems, then, to be agreed that one part of our immortality is not natural, but is a gift flowing from the Incarnation! This may render it all the more worth our while to examine whether our immortality is likely to be thus divided, and to be natural and indefeasible as to the soul,

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but only a gift of the Christian system as to the body. One portion of the gap between the opposite opinions would appear to be bridged over by these considerations, which lead towards the conclusion that, with St. Paul for our guide, we shall not readily be persuaded* to accept the idea that the Gospel has propounded to us the natural immortality of all human souls as a portion of the Christian religion.

W. E. GLADSTONE.

(*To be Concluded.*)

* Plato teaches that the body as well as the soul, though not, like the gods of popular opinion, eternal, yet having once come into existence, was indestructible. (*Laws* x, 904.) There are souls of the sun and stars (*Tim.* 41, *Laws* x, 899). In man death (*Laws* viii, 828) dissolves the union between them. Impurity (*Phaedo*, 81, *sqq*) will prevent the total escape of the soul. But Socrates hopes to live wholly apart from the body, and this seems to represent the summit of doctrine concerning the body. We find a metaphysical conception recorded on its behalf, but a manifest leaning of the speculative intelligence against it.

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NOTES AND COMMENTS.

CONSTITUTIONAL SUFFRAGE FOR WOMEN.

THE Constitution of the United States permits the suffrage of women. The agitation of the suffrage question for the last forty years and the appeals to the Congress of the United States for aid have been largely idle and valueless. The women of the United States are, by the Federal Constitution itself, already admitted to the polls upon the same footing as men. There is in this great document, the charter of the liberties of woman no less than the liberties of man, no bar to universal suffrage. Under it legally constituted women—as to age, freedom from criminalness, etc.—may vote for all officers from president to township supervisor.

In the election of 1896 the women of the State of Colorado will be permitted by that State to vote for the presidential electors from that State. In this fact there is promise of a singular contingency, with possibly grave results. Let us not take for our authority in this matter some learned judge's opinion, some essay, some suffragist's pronunciamento. Let us the rather take the Constitution's words themselves. It is provided in Article XIV., declared in force in July, 1868:

"Section 1. All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property, without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws."

Now we have here a very plain and explicit statement of who are citizens of the United States. They are "all persons born or naturalized in the United States, and subject to the jurisdiction thereof."

In the next amendment to the Constitution, the XVth, declared in force in March, 1870, it is set forth, for the benefit of the suffrageless negro, that:

"The right of citizens of the United States to vote shall not be denied or abridged by the United States or by any State on account of race, color, or previous condition of servitude."

Incongruous as it may seem, this very provision allows the negro women of the United States the right of suffrage. It specifically permits those citizens who had been in a previous condition of servitude to vote, and the previous article as specifically sets forth what a citizen is—a person born or naturalized in the United States and subject to the jurisdiction thereof. The only question which can arise is as to the meaning of the word "person." In such a case it is necessary to accept the definition of

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the lexicographers who unite in saying that a person is a human being, a man, a woman, or a child. By no twisting construction could a "person" be designated a male alone. It has been proven essential in the administration of the affairs of men to set an age for adultism, to coin a word, adultism for man and woman. Of course it would be a silliness for anyone to contend that, because a child is a person, therefore, a child is entitled to the suffrage as well as a woman. Adultism is, of course, understood.

Manhood suffrage had been the only suffrage, in extended form, through the years of the republic before these amendments were considered. It is the only recognized suffrage now in most States for all offices, save those of local importance which have been opened to the suffrage of women; and it is but natural to suppose that the race of American men who had done all the voting of importance for the century or more should look upon man as the only "person" permitted by the Constitution the right of suffrage. Indeed, in the second section of the XIVth amendment this is the more clearly emphasized by the statement that:

"When the right to vote at any election for the choice of the electors for President and Vice-President of the United States, representatives in Congress, the executive and judicial officers of a State, or the members of the legislature thereof, is denied to any of the male inhabitants of such State, being twenty-one years of age and citizens of the United States, or in any way abridged, except for participation in rebellion or other crime, the basis of representation therein shall be reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such State."

It will be noted that in this, a provision for the betterment of the negro, and the only place in the Constitution of the United States where sex is specified, there is not the slightest suggestion of a provision that women may not also be voters, no utterance that they are not as truly "persons" and "citizens" as the negroes whose rights were being fortified. It was found essential after the war of the rebellion to frame into the Constitution a provision which should secure honesty of representation, universality of suffrage, among the male negroes. But it was by no means a provision defining the voting prerogative. It attempted no sex restrainments. It bore no relation to the question of universal suffrage. It was only to be taken as an expression relative to the incoming voting element. Of course, had the woman suffragists, before the adoption of these amendments, pressed their claims at the bar of the State instead of the nation, and had secured a State right to the ballot, it would have been unnecessary to incorporate this word "male" in this section of the XIVth amendment. It is used to distinguish an immediate voting element.

Let us suppose that the coming Presidential election shall prove to be very close, as the word goes. When the Senate and House of Representatives in joint session assembled are ready to canvass and record the national suffrage, what will be done with the vote of Colorado, largely cast by women? Will the vote of Colorado, in spite of the fact that it was legally cast under the laws of that State, be thrown out as fraudulent, or, at least, tainted? Immense significance might attach to this ballot, for, in a closely contested election the next President of the United States would owe his elevation to the votes of these Colorado women; or, if Congress should reject their ballots, to a general election at the hands of the House of Representatives.

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But would Congress have any such right—to reject their ballots? Congress could do nothing to subvert the Constitution, which has placed no obstacle in the way of suffrage by women. It is not the province of Congress to elucidate, amplify or restrict the Constitution. Neither can it read into that document something of which it is innocent. Still further, it could not declare these ballots illegitimate because they will be cast under specific sanction of the State of Colorado. Congress is a law-making, not a law-breaking, body. It has its great and important functions, but the Federal Constitution stands high above it, panoplied in the strength and majesty of its own power. No doubt there would be a prodigious effort to settle then and there the question as to whether these Colorado women should be allowed to decide who should be President of the United States to succeed Mr. Cleveland, but, as this question is a constitutional one, who but the Supreme Court could pass upon it? In the light of the fact that the Federal Constitution places no obstacle in the way of the voting of these Colorado women, it is difficult to see how the Constitution could be interpreted by the Supreme Court, when the matter came, as it doubtless would, to that body, adversely to the right of suffrage for these women.

In *resumé* the following may be considered:

1. The Constitution of the United States permits suffrage by women.

2. Congress must receive presidential ballots cast by women in States granting them the right of franchise; or else, on rejection of such ballots, the Supreme Court must pass on the legality of these votes.

3. There being no specific provision in the Federal Constitution either for or against the suffrage of women, the only bar to their voting for all officers of the State and nation is found in the constitutions of individual States, which constitutions may at any time be so modified as to permit universal suffrage if the States themselves so elect.

4. The only way by which the franchise may be universally and irrevocably denied to women in the United States is by an amendment to the Federal Constitution, specifically providing that only male citizens of the United States shall be allowed the right of suffrage.

If, as now seems assured, the women of at least one State, Colorado, will vote at the national election of 1896, for President and for members of Congress from that State, there promises to be presented to the people of the United States a question of deeper interest and immenser importance than any other peace-time question since the adoption of the Federal Constitution.

W. S. HARWOOD.

GREAT BRITAIN'S SERVICE TO CIVILIZATION.

SUCH a clear, concise, yet comprehensive statement of the great work that is being done for the world by England as is presented in the very able article by Mr. David A. Wells in the April number of the REVIEW, has never before appeared for the benefit of American readers. I have visited many British colonies in various parts of the world, and I have had occasion to compare them with nearby Latin-American republics, the successors of 300 years of Spanish rule, and I can endorse all that Mr. Wells has to say. In 1892, while in command of the U. S. S. "Kearsarge," I ascended the identical river, the Orinoco, which Mr. Wells would see thrown open to navigation—going as far as Ciudad-Bolivar (formerly Angostura), 240 miles above its mouth—and

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I do not hesitate to state that if that great waterway were located in a British possession, its shores, instead of being as they now are for the greater part of the way a howling wilderness, would be lined with prosperous settlements, and the waters of that mighty stream would be carrying 100 tons of shipping where they now carry one; that those great civilizers, trade and commerce, and agriculture, backed by law and order, would bring about in the adjacent territory a state of affairs that has never yet entered the head of the average Latin-American politician. If England has grabbed territory, she has grabbed it to some purpose, and no people or race, be they civilized or savage, that has come under her rule but has been raised in the social scale, benefited and made free, where formerly they were degraded, if not in an actual state of savagery or slavery.

It is all very well to "twist the Lion's tail," but truth is truth, and it is time the people of this country should, as regards England's rule and methods in her colonies and possessions, know a little more of it.

It is a pity that every person in this country could not read Mr. Wells's article, and let it thus be the means of doing away with a prejudice that is largely founded on traditional sentiment, fortified by ignorance.

Though the British Goverment has the name of a Monarchy, Americans should understand that it is to-day—and has been for the past sixty years—as much of a democracy as our own, and that it has done more to elevate and improve the condition of human beings in this benighted world than any other government on the face of the earth or, I might say, than all others combined.

A. S. CROWNINSHIELD,
Captain U. S. Navy.

METHODISM AND THE GENERAL CONFERENCE.

ONE person out of every fourteen, one Christian out of every five, one Protestant out of every three in the United States is a Methodist. The statistics for 1895 show that there are in this country 5,452,654 members of the Methodist Church, and that the increase in membership for the year has been at the rate of one thousand every day.

The Methodist Church had its birth at the University of Oxford. A few students at Oxford of marked ability, of excellent scholarship, and of sterling character, becoming profoundly convinced of the necessity of a deeper religious experience, of a higher life, and a broader service for others, organized a club for religious purposes. The fellow-students were inclined to make fun of them, calling them among other names bible-moths, and Methodists, the last name of criticism being adopted as the permanent name for the denomination in this country. The Wesleys, Whitefield, and other members of the club took the coals from the college and lighted fires all over England and America. Wm. E. Gladstone in his great lecture at Oxford in 1893 thus refers to the founder of Methodism: "The remarkable will, energy, and character of John Wesley, now after a century and a half, are represented in the English-speaking race by organized bodies of adherents estimated at not less than 12,000,000, and by some at such a high figure as to exceed 20,000,000."

John Wesley was a statesman and organized the movement into permanent societies, which grew so rapidly that in five years from the time he gathered his first class it became necessary to organize a conference.

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A band of Irish emigrants who had listened to Wesley preach in their home land, and had accepted his doctrine, came to New York city in 1760. Some of them having backslidden were gambling in a room, when Barbara Heck opened the door and rebuked them, saying: "We shall all go to hell together," and, looking at a man who had been a local preacher, said: "And our blood shall be upon you, Philip Embury, who ought to be preaching to us this day." The man heeded the rebuke and opened his residence, a little one-story house in Park Place, and preached to the people. Numbers drove them to an old rigging loft on Horse and Cart street (No. 120 William street), which soon became too small for the crowds that assembled. Ground was bought of Mrs. Barclay, widow of the second rector of Trinity Church, and in 1768 the first Methodist meeting house was built in America on the site now occupied by John Street Methodist Episcopal Church. At the close of the Revolutionary War, at the Christmas conference at Baltimore, on December 24, 1784, the Wesleyan Mission became the Methodist Episcopal Church. There were then 15,000 members, which number to the present time has doubled itself eight and one-half times, while the population of this country has only doubled itself four and a half times. In 1844 the slavery question divided the Church and the Methodist Episcopal Church South was organized. In 1872 it had about 600,000 members; now it has nearly 6,000 preachers, over 13,500 churches, and 1,380,000 members. The General Conference now being held in Cleveland, Ohio, is the legislative body of the Methodist Episcopal Church. This branch of Methodism has 16,000 ministers, 24,605 churches, and 2,630,000 members. There are about 3,000,000 in its Sunday Schools, and 1,250,000 members of a young people's society, recently organized, called the Epworth League. It has a publishing house with a net capital of $3,397,000, whose profits last year were in the neighborhood of $200,000, more than a half of which was given to disabled ministers and widows and orphans of ministers. Its missionary society gives $1,250,000 annually. Its church extension society has nearly $1,000,000 of an endowment fund, and builds three new Methodist churches in the United States every day. Its Freedman's Aid and Educational Society has spent over $4,000,000 since the war in the South, for the education of the blacks and poor whites. It has educational institutions whose grounds and buildings are worth $14,000,000, whose endowment is about the same amount, and whose students number 43,000. Its periodicals are able and widely circulated. Every department of benevolent work is represented by efficient organizations.

The General Conference meets every four years on the first of May and continues its session a month. It is composed of ministerial delegates elected by the annual conferences on the basis of one representative to every forty-five members, and of lay delegates, two of whom are allowed for each conference, except where there is but one ministerial delegate, when only one is permitted. The lay delegates are chosen by an electoral conference composed of one layman from each charge. The conference in session in Cleveland is composed of 520 members.

The two most important questions to be considered are the admission of women as lay delegates to the General Conference, and the removal of the time limit forbidding more than five years of continual service in any pastoral charge. Laymen had no voice in making the laws of the Methodist Church till the year 1872 when the General Conference admitted lay delegates. This action opened the question as to woman's eligibility to a seat

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in the General Conference. In 1880 and 1884 several women were elected as reserve delegates, and at the General Conference of 1888 held in New York five women delegates appeared demanding admission. After a long, warm and able discussion the women were excluded, the lay and ministerial members both recording a majority against them. The question was then sent down to the churches, and the people gave a majority in favor of the women, but as the Annual Conferences did not give a two-thirds majority women were excluded from the General Conference of 1892. The Annual Conferences of 1895–1896 were asked to vote again on the subject. The vote is so close that returns from the last conference will be necessary to determine the result. Four conferences did not receive official notice of the proposed question; which fact may invalidate the whole vote.

It is hinted that the friends of woman's admission, should they fail to secure a three-fourths vote of the preachers, or a two-thirds vote of the General Conference, will claim that no change in the constitution of the church is needed, and admit women by a majority vote of the General Conference. Such a step would be unfair and calamitous.

Mrs. Bashford, wife of President Bashford, of the Ohio Wesleyan University, has been elected a delegate to the present General Conference, and it is possible she will be admitted by the constitutional two-thirds majority. Then would follow inevitably the licensing of women to preach, their ordination, their appointment to pastoral charges, and their election to any office in the Church, including that of the Episcopacy. We think the Church has plunged too precipitately into the revolution. The agitation of this question was begun by brilliant consecrated women, who, acting upon the theory that woman was oppressed, when she was enjoying the supremacy of love, that her sphere was circumscribed, when it was as wide as home or nation demanded the mastery of authority as well as of love. These agitators were aided by a band of women outside of the Church, who, in their demands for a feminine masculinity, brushed aside the example of Christ, ridiculed Paul, hissed at the Church, and insisted upon woman's admission to the General Conference. The new idea grew rapidly. The coal dropped into the tuft of grass now sweeps through the Church as a forest fire. The people, generally, ministers and laymen, think the time has come for the change; that it will not hurt woman, but will add wisdom, energy, and usefulness to the Church. Majorities have no power to turn folly into wisdom. A large majority killed Socrates and crucified Christ. If the change is against nature and the Scriptures, as many firmly believe, a four-fourths majority would not make it right.

Another important question that will be discussed is the time limit of pastoral service. For one reason or another short pastorates have been the rule of the Christian ministry in this country. It is believed that the average term of the so-called settled pastorates is not over three years. While ministerial migration is the law, there are in other denominations long pastorates, some of them the symbols of stagnation, some of them unfortunate in breaking the heart of the pastor or breaking up the church when the pastoral relation is severed, but some of them an unmixed blessing. We believe the Methodist Church can make a long term possible without destroying the itinerant system, and should do so. The time limit is not now and never has been one of the restrictive rules or a part of the constitution of the church; it is only what might be called one of the by-laws. There was no limit in Wesley's day.

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He stayed as long as he pleased and kept his preachers in a place as long as he desired. Circumstances made their stay in one charge necessarily brief. There was no time limit in the Methodist Church of this country at the beginning. Bishop Asbury influenced the General Conference of 1804 to vote a limit of two years on the pastoral term of any man in a single charge. The limit applied only to pastors. Secretaries, agents, editors, presidents or professors of colleges were exempt.

This limit was retained for sixty years, when, at the General Conference of 1864, it was moved up to three years, where it remained till the Conference of 1888, when it was extended to five years. We believe it would be an advantage to the Church if the time limit were entirely removed. The change from two to three and then to five years has not destroyed the itineracy as the opponents of the change maintained, nor do we think that a removal of the limit would destroy it. In the earlier history of this country, when the population was scattered and migratory missionary labor seemed to be almost the sole need, and the pioneer ministers adjusted themselves to the need with marvellous facility, the time limit acted as a strong arm of evangelistic power. Now that the population is more settled and its rush to the cities is so impetuous, the work of building up the Church and adjusting it to the changed social conditions is as imperative as gathering the people into the kingdom, and a longer term in the great cities is a necessity. A longer term would be good for the minister. It would compel increased diligence in reading, study and pulpit preparation. It would enable him to lay deeper and broader plans and build more substantial and artistic superstructures. The dead line is where a minister ceases to do new work, though he be but thirty years of age. The change would give the Methodist ministers the opportunity that those of other denominations have of fastening themselves to the local institutions of education, benevolence, and reform.

The lengthening of the term would dignify the regular pastorate which under the present system is too often discounted. The removal of the limit would be good for the churches, permitting a short or a long term as the people might desire or Providence indicate. Dr. J. M. Buckley, in an editorial in the *Christian Advocate* of April 2, makes a compromise proposition which is likely to be adopted by the Conference at Cleveland. It is as follows: "When a Quarterly Conference, without debate in the absence of the pastor, by ballot, shall by a three-fourths vote of the entire membership of the Quarterly Conference assigning the conditions of the pastorate as the ground for the necessity, request the reappointment of the pastor whose limit is about to expire, the Bishop presiding at the next Conference may return such pastor for another year, without regard to the number of years he may have served already in the charge." Dr. Butts, President of Drew Theological Seminary, suggests as an amendment to the proposition that in these exceptional cases only five additional years of service be allowed or ten years in all.

F. C. IGLEHART.

THE AGRICULTURAL PROBLEM.

NO INTELLIGENT man who has had opportunities for observation can doubt that the "Agricultural Problem" is the most vital in American politics to-day, though it has been thrust aside by issues that are at most only corollaries to the main proposition.

The situation is anomalous and unparalleled. The country has had

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profound peace for thirty years. There have been no famines. In fact, this period has been one of wonderful productiveness. Yet every year the farmers as a class have become poorer. Every year it has been found more difficult for them to meet their obligations. The farmer goes in debt for the things necessary to raise a crop, and when the day of settlement arrives the price of farm products has gone down, and relatively money is dearer.

The statement is frequently heard that the farmer is not progressive, that he should buy machinery and fertilizers, and curtail living expenses. It is not worth while to enter into a discussion relative to such statements. In part they are true; as a rule they are false.

The American farmer is progressive; he is intelligent; he is frugal. He is a hard worker, and the pinched and careworn face of his wife shows that she bears her burden. They are a brave and hopeful couple, but they are beginning to despair. And when they do the institutions of our Republic will topple down upon us, a mass of shapeless ruins.

Bacon says: "Let States that aim at greatness take heed how their nobility and gentlemen do multiply too fast; for that maketh the common subject grow to be a peasant and a base swine, driven out of heart, and, in effect, but a gentleman's laborer." Again, he says: "Neither will it be, that a people overlaid with taxes should ever become valiant and martial," and he draws the conclusion that "no people overcharged with tribute is fit for empire."

The materialistic reasoners of the present day decry the lessons of history. They point to the wonderful progress of this century and say: "A new era has dawned; let our children study the practical arts and sciences taught in our technical schools and learn to make a living." Again we have a grain of truth mixed with much sophistry. We are departing from the profound methods of our ancestors. And nations like men are slow to profit by the experience of others.

It is not necessary to insist upon the importance of the farming interests of the country; or to point out to the effect that the farmers' prosperity or decay has upon all other callings and upon the moral, social and intellectual development of the country. Draper shows how the first awakening of mind took place in those countries where the farming classes were most prosperous, and were enabled to make a living with the least amount of drudgery. Egypt in the old world, and Peru and Mexico in the new, furnish examples. Even a loose reader of history will be struck with the elasticity and energy the husbandman has shown since we have authentic accounts of human events. Whenever the land has been relieved of its burdens, whenever the farmer has been made to bear, either directly or indirectly, only his just proportion of the load of taxation, in how short a time has he gathered his strength and made the face of nature to blossom as the rose and to smile in prosperous abundance. Witness France when Napoleon had a breathing spell from his wars; witness Spain after the Moorish conquest. The history of any country will bear similiar testimony

The rule has been that young countries are prosperous before wealth flows into great reservoirs, and power and expenditures increase until agriculture is oppressed. Then decay begins. All sorts of nostrums are proposed, but the malady is deadly unless the knife is applied to the cancerous root.

Some eighteen hundred years ago Plutarch wrote: "It was well and truly said that the first destroyer of the liberties of a people is he who first gives them bounties and largesses." He was a great student of history, and at

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this time saw Rome at the pinnacle of her glory start slowly on her descent to the depths of degradation. Great minds were at work in Rome, some trying honestly to solve mighty political problems, others—demagogues on the grandest scale the world has seen—attempting to secure power and wealth by pandering to the rabble. Wheat was being distributed free to the populace to keep them quiet, great shows were being displayed to please them. The Emperor and two thousand rich patricians owned the known world. Of the 110,000,000 Roman subjects, 60,000,000 were literally slaves. Agriculture had reached or was fast approaching its lowest ebb. It was being claimed that the soil of Italy was worn out past redemption, and learned treatises were being written on this subject. Columella felt called upon to controvert a theory that both the air and land had lost their fertilizing qualities. Cicero, Cato, Varro and many other eminent Romans wrote on this subject, and attempted to revive interest in agriculture, which was no longer profitable and consequently neglected. A few years previous Marius had ordered a re-allotment of land, to appease the popular clamor, and had given sixteen acres to each individual. Yet there was no relief.

Five hundred years later Theodoric, the Ostrogoth, overran Italy, struck the shackles of law from the hands of the farmer, and a period of great prosperity followed. Gibbon says, a purse was safe upon the public highway, wine sometimes sold as low as a cent and a half a gallon, and wheat was worth sixteen and a half cents a bushel. And Italy is to-day one of the fertile countries of the world. Rome also tried her hand on fiat money and made a failure. In the declining days of the empire it was thought that a more abundant circulating medium was the thing most needful. Consequently coins were debased by a copper alloy until little of the original metal was left. It had the Roman stamp upon it and was money, but it did not remedy the evil. It is interesting to recall in this connection the estimate of Herodotus that in the reign of Darius, King of Persia, some 2,400 years ago, gold was worth thirteen times more than silver. Also that in the year 1,700 A. D., gold was worth about fifteen times more than silver. Of late years the production of silver has been so enormous that now one ounce of gold is worth about twenty-three ounces of silver.

When it is remembered that nearly one-half of what the American farmer makes—for the average farmer earns no more than a living—is consumed in taxes, direct and indirect, it is wonderful that he is in distress? Is it strange that he is willing to try almost anything that promises relief? Is it not rather almost beyond belief that he has suffered in patience so long? Is it necessary to point out the remedy to the intelligent reader?

"The first destroyer of the liberties of a people is he who first gave them bounties and largesses."

M. B. MORTON.

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